THE IRISH NATURALIST

A Monthly Journal

OF

GENERAL IRISH NATURAL HISTORY

ORGAN OF THE

Royal Zoological Society of Ireland; Dublin Microscopical Club;
Belfast Naturalists' Field Club; Dublin Naturalists' Field Club;
Cork Naturalists' Field Club

EDITED BY

GEORGE H. CARPENTER, D.Sc., M.R.I.A.

R. LLOYD PRAEGER, B.E., D.Sc., M.R.I.A.

AND

ROBERT J. WELCH, M.R.I.A.

VOL. XXXI.

DUBLIN: EASON & SON, LIMITED,
80 MIDDLE ABBEY STREET.

BELFAST: 17 DONEGALL STREET,

LONDON: SIMPKIN, MARSHALL, HAMILTON, KENT & CO., LTD.

1922.

CONTRIBUTORS

TO THE PRESENT VOLUME.

Abbot, W. M., Fermoy.
Baring, Hon. Cecil, Lambay.
Bell, Robert, Belfast.
Bingham, J. N., Belmullet, Co. Mayo.
Brunker, J. P., Dublin.
Burkitt, J. P., Enniskillen.
Butler, James G., Bagnalstown.
C., J., Belfast.
Carpenter, Prof. George H., d.sc., Dublin.
Chase, Corrie D., Belfast
Clampett, G. T., Dublin.
Cole, Prof. Grenville A. J., d.sc., Dublin.
Cott, H. B., Athlone.
Delap, M. J., Valentia Island.
Dixon, H. N., Northampton.
Farran, G. P., Dublin.
Foster, Nevin H., Hillsborough.
Friend, Rev. Hilderic, Birmingham.
Greer, Thomas, Stewartstown.
Halbert, J. N., Dublin.
Harrison, Athole, Dublin.
Hinch, J. de W., Dublin.
Johnson, Rev. W. F., Rostrevor.
Langham, Sir Charles, Bart., Tempo Manor, Enniskillen.
Lee, William A., Rock Ferry, Cheshire.
Le Fanu, T. V., Bray.
Loewenthal, Joan Elsa, Belfast.
Massy, A. L., Baily, Co. Dublin.
Moffat, C. B., Dublin.
Pack-Beresford, Denis R., Fenagh, Co. Carlow.
Pack-Beresford, R., Athlone.
Phibbs, Geoffrey, Dublin.
Porter, Lilian, Cork.
Scharff, R. F., ph.d., Bray.
Sclater, W. L., London
Scully, Reginald W., Dundrum, Dublin.
Stelfox, A. W., Dublin.
Stendall, J. A., Sidney, Belfast.
Stoney, C. V., Raphoe.
Welch, Robert J., Belfast.

ILLUSTRATIONS

PLATE.

INDEX.

The Irish Naturalist.

VOLUME XXXI.

THIRTY YEARS' WORK OF THE "IRISH NATURALIST."

BY R. F. SCHARFF.

It is a difficult task briefly to review the contents of the thirty volumes of the *Irish Naturalist*, or give credit to the many scientific workers who contributed to its pages. But it was suggested to me to attempt such a review so as to give those who may not be acquainted with this Journal some idea of its aims and of the amount and usefulness of the information contained in it.

The Journal was founded in the year 1892 to enable the many observers in all branches of Natural History in Ireland to compare notes and to make known to the public the results of their work. It was felt by those who met together in Dublin to discuss the matter that a journal of this kind would bring the young naturalists in Ireland into closer touch with one another and with the great national institutions, the Dublin Museum, and the Botanic and Zoological Gardens. Fortunately two distinguished naturalists, namely, G. H. Carpenter of Dublin, and Robert Lloyd Praeger who then resided in Belfast, were willing to edit the journal. It thus brought together the many observers living in these two great centres of education, while all the natural history societies of Ireland supported the movement. The governing bodies of the Royal Zoological Society of Ireland, the Belfast Natural History and Philosophical Society, the Belfast Naturalists' Field Club, the Dublin Naturalists' Field Club, the Dublin

Microscopical Club, and the Cork and Armagh Naturalists' Field Clubs, accorded a hearty welcome to the new magazine. The editors reminded us that a study of natural science has a most important bearing on the industries of the country and that they hoped by spreading scientific information and encouraging scientific tastes, to have some influence for good on the labours of the people generally.

In a scientific journal like the *Irish Naturalist* with a necessarily small circulation neither the editors nor the contributors receive any remuneration. Their labour is given free of charge because they are keenly interested in spreading a taste for natural history among the people and because they enjoy work which advances our knowledge of nature. During the thirty years' existence of the journal many articles and notes of the greatest interest have been published. Scores of species of animals and plants new to science have been described in its pages and hundreds that had not previously been recorded from this country. At the conclusion of the twenty-fifth volume an author index was published, and anyone who is anxious to know the names of the contributors and the subjects of their contributions in the twenty-five volumes can refer to it. I need, therefore, only give a general survey of the subjects dealt with and mention the names of a few of the more prominent authors.

Natural History in a wide sense includes Zoology, Botany and Geology, and nearly all the papers that appeared in the thirty volumes can be easily grouped under these three headings. A few are of wider scope or are only indirectly connected with these subjects. Mr. Praeger was chiefly instrumental in bringing about an Union of the various Irish Naturalists' Field Clubs. This Union met from time to time at different places when subjects of scientific interest were discussed, and special observations were made on the natural history and archaeology of the district. Full reports of these conferences were published in the *Irish Naturalist.* The journal also contains most valuable reviews of the natural history books issued during the past thirty years and reports of the Proceedings of all the Irish natural history societies. The Royal Irish

Academy's Fauna and Flora Committee and the Fisheries Branch of the Department of Agriculture and Technical Instruction published a large number of valuable papers on the natural history of Ireland. Abstracts or reviews of all these as well as of all papers relating to Irish zoology, botany or geology in British or foreign journals are to be found in the pages of the *Irish Naturalist.* It will only be necessary now to allude to the more prominent original papers contained in the journal.

GENERAL SUBJECTS.—The editors have contributed articles on the meetings of the British Association in Dublin and Belfast and on the Clare Island Survey. Prof. Carpenter wrote on the peculiar mingling of animals of southern and northern origin, on the "Dublin Museum and Irish Naturalists" and on "Useful Studies for Field Naturalists." Mr. Praeger's papers dealt with Irish Field Clubs, the Irish Field Club Union, the Fauna and Flora of Clonbrock, the Conferences of Kenmare, Sligo, Galway and Rosapenna, Irish Caves, the Bog-burst disaster in County Kerry, an Expedition to Rockall, ten years' work of the Fauna and Flora Committee, a method of representing Geographical Distribution, the origin of the Fauna and Flora of Lambay, and Derc Ferna, or the Cave of Dunmore. Historical notes on Lambay was the title of a paper by the Honourable Cecil Baring. The subject of caves was treated by several authors. Among them may be noted accounts of visits to Mitchelstown Cave by E. A. Baker and by E. A. Martel; Blackwater Cavern by J. H. Comyn and by R. W. Evans, H. J. Molony and E. C. Ronayne; Ovens Cave by R. W. Evans; and the Cave of Cloyne by F. H. Maberley. R. J. Ussher wrote on Castlepook Cave in County Cork and on "Cave Hunting." "The Aran Islands, a study in Ethnography" was the title of an article by Professor A. C. Haddon. N. Colgan chose as subjects "An Irish Naturalist in Spain," "The Folk Lore of Irish Plants and Animals," and "Irish Animal Names." C. B. Moffat's contributions entitled "The Struggle for Existence" were the first published exposition of that principle of claim to "territory" by birds during the breeding season, which is now regarded as most important by many ornithologists.

The late Sir R. Ll. Patterson dwelt on the changes on the foreshore of Belfast Lough and W. F. de V. Kane on Recent Progress in Irish Natural History. Recent Irish Glaciers was the subject discussed by the late G. H. Kinahan. R. Welch described the Gobbins Cliffs and Caves and a new Irish Museum in Belfast. Prof. Gregg Wilson communicated an essay on the proposed Marine Laboratory for Ulster. A few more subjects may be mentioned, namely, Three Weeks in South Kerry by F. Bouskell, the State of Ireland by R. Southern, and finally Provincial Museums and the Irish Names of Animals by myself.

Zoology.—As might be expected in a magazine devoted to the natural history of a definite geographical area, the zoological papers in the *Irish Naturalist* have been largely faunistic in scope. The Reports of the Field Club Union Conferences at Galway, Sligo and Kenmare included lists of animals of various groups with many new records, and the Survey of Lambay in which many observers collaborated was a fairly complete piece of faunistic work, which led up to the monographic work on Clare Island afterwards undertaken by the Royal Irish Academy. Among local records of various groups of animals may be specially mentioned papers on collections from the Mitchelstown Cave by Carpenter, and from the MacGillicuddy's Reeks by Carpenter and Scharff.

Many papers on Irish Vertebrates have appeared during the thirty years. Among Mammals, the most noteworthy work has been done on the Irish Bats ; the series of papers by the late N. H. Alcock and C. B. Moffat on the habits of native species—the Whiskered, Long-eared and Hairy-armed—contain valuable material for the student of European Mammals. Articles on Birds have, of course, been very numerous, papers setting forth detailed statistics as to species breeding in various districts of Ireland by R. J. Ussher and R. Warren, and articles on migrants by R. M. Barrington are memorials of the work of those three great ornithologists and of the keen interest which they showed in this magazine. Much of their work was subsequently incorporated in their well known books. Mention must also be made of the vivid account of the habits of

many common birds contributed by C. B. Moffat and J. P. Burkitt, and the observations on migrants at lighthouses by Prof. C. J. Patten. Articles of much interest were contributed also by the late Rev. Dr. C. W. Benson, and G. E. H. Barrett-Hamilton, by D. C. Campbell, W. E. Praeger, R. F. Ruttledge, and many others. Early in the career of the *Irish Naturalist* the present writer discussed the "native" standing of the Common Frog in Ireland, and was opposed in his opinion by W. F. de V. Kane. E. W. L. Holt wrote on new Irish Fishes, and C. T. Regan on Irish Char.

Turning to invertebrate animals, my list of Irish Land and Freshwater Mollusca published in the first volume has been followed up by a series of valuable papers on particular species or the fauna of special districts by Rev. E. W. Bowell, Prof. A. E. Boycott, R. A. Phillips, A. W. Stelfox and R. Welch. Important anatomical and systematic work on Vitrina, Limnaea, Pisidium and other genera is included. Marine Mollusca have been dealt with in papers by N. Colgan, G. W. Chaster, A. R. Nichols and other conchologists. Our knowledge of Irish Insects has been materially advanced by the work of F. Balfour Browne, G. H. Carpenter, J. N. Halbert, Rev. W. F. Johnson, the late W. F. de V. Kane, D. R. Pack-Beresford, and others embodied in an extensive series of systematic and bionomic articles and local lists. Besides the more familiar Lepidoptera and Coleoptera, Hemiptera, Hymenoptera, Diptera and the lowly Apterygota are dealt with in these papers. Irish Arachnida have been dealt with by G. H. Carpenter, D. W. Freeman, J. N. Halbert and D. R. Pack-Beresford, and Crustacea by R. H. Creighton, W. F. de V. Kane and others. The terrestrial Crustacea (Oniscoidea) have been listed and described by the writer of this article and N. H. Foster, while Rev. H. Friend, R. Southern and others have dealt with various groups of worms. R. Hanitsch's paper on Irish Freshwater Sponges is noteworthy as the earliest pronouncement on the definitely American element in the Irish fauna, though his supposed three transatlantic species have been reduced to one by the subsequent work of Mrs. Scharff.

Botany.—As is usual with journals devoted to natural history in its wider sense, Flowering Plants have bulked large in the pages of the *Irish Naturalist.* Most of the discoveries of the last thirty years have been announced in its pages, and such important works as Colgan's "Flora of the County Dublin," Scully's "Flora of County Kerry," and Praeger's "Irish Topographical Botany" have been foreshadowed by papers by the respective authors in this magazine. Floral survey work has indeed taken a leading place, and the papers published include accounts of the flora of the Fergus Estuary and the barony of Shanid, Central Clare, Achill Island, Clare Island, Inishturk, the Mullet, the Fermanagh hills, the Antrim plateau, and County Armagh; revisions with many additions of the flora of the Blaskets, Inishmore (Aran Islands), Inishbofin, Lambay; and important contributions to the flora of Kerry, Wexford, Westmeath and Dublin. Among the writers of these papers are N. Colgan, Miss Knowles, H. C. Levinge, C. B. Moffat, Miss C. O'Brien, R. A. Phillips, R. Ll. Praeger, and R. W. Scully.

Other papers have discussed the characters or occurrence or distribution in the country of certain special plants, such as *Potamogeton undulatus* (A. Bennett), *Vicia Orobus* (C. J. Lilly), *Lathyrus maritimus* (R. W. Scully), *Spiranthes Romanzoffiana* (W. J. C. Tomlinson), *Erica Stuarti* (E. F. Linton), *Lastrea remota*, *Asplenium Adiantum-nigrum* var. *acutum*, and *Equisetum litorale* (R. Ll. Praeger), *Adelanthus dugortiensis* (H. W. Lett), *Peziza Adae* (J. Strachan) or of groups of plants, large or small, such as Helosciadium (H. J. Riddelsdell), Fumaria (R. Ll. Praeger), Characeae (J. Groves and G. R. Bullock-Webster), Rubi and Rosae (R. A. Phillips, W. Moyle Rogers, R. W. Scully, &c.), and many papers on the lower Cryptogams, including Mosses and Hepatics, (J. H. Davies, H. W. Lett, D. McArdle, C. H. Waddell, &c.), Fungi (J. Adams, W. B. Grove, E. J. McWeeney, G. Pim, Carleton Rea, &c.); Lichens (J. Adams, M. C. Knowles, &c.); Algae (E. A. L. Batters, J. Adams, A. D. Cotton, Miss Duke, M. Foslie, Miss Hensman, T. Johnson, &c.); and Mycetozoa (W. F. Gunn, Carleton Rea, Mrs. Stelfox, C. Torrend, &c.). Except among the

Lichens and lower Algae, in which groups the Irish workers have been too few in recent years, there is hardly a genus in the whole Irish flora which has not come in for some attention in the pages of the *Irish Naturalist.*

In GEOLOGY the record is not so extensive, as that science has fewer votaries than zoology or botany. Nevertheless, the geological contributions form a large array when brought together. They reflect excellently the field-work of the last thirty years, which has been largely concerned with the elucidation of the surface deposits of our country, and many of them deal with the period which ranges from the pre-Glacial raised beach of the South of Ireland to recent Kitchen-middens. Glacial deposits and their contained fossils, or Glacial phenomena, are discussed by Joseph Wright, Maxwell Close, Prof. Sollas, Prof. Cole, Mellard Reade, Callagan, Kilroe, Hallissy, W. B. Wright, A. Bell, Hinch and Praeger, and the succeeding warmer period which culminated in Neolithic times is discussed by Hinch and Praeger. There are contributions on the older rocks by R. C. Carruthers, H. B. Muff, A. H. Foord, R. Kidston, R. Welch, and others, and Prof. Cole writes on the fascinating subject of meteorites.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 14.—The Club met at Leinster House, the President in the chair. PAUL A. MURPHY showed a rust which was found plentifully on leeks in two cases during the month of December, 1921. In spite of the time of the year only the Uredo stage was present. This, however, agreed well with *Puccinia Porri* (Sow.) Wint., except that the spores were found to have up to six germ pores. The size of the spores was on the average $31\mu \times 25\mu$. This rust does not appear to be common or to do serious damage, at least in the later stages of the host's growth.

SIR F. W. MOORE showed a section of the bark of *Eucommia ulmoides* in which the solid particles of gutta in many of the cells were clearly visible. The plant, which forms a small tree, comes from fairly high altitudes in central and western China and is hardy in the British Islands. It has received attention as a possible source of supply of gutta percha

W. F. GUNN showed a slide of radium salt and demonstrated the disintegration of atoms by loss of helium particles. The emanation was clearly visible against dark background with a No. 3 Leitz objective.

MAGDALIS CARBONARIA AND OTHER INSECTS AT POWERSCOURT.

BY J. N. HALBERT, M.R.I.A.

WHILE collecting in the Deerpark at Powerscourt, Co. Wicklow, on the 9th of June, 1919, I found two specimens of the weevil *Magdalis carbonaria* L., by sweeping bracken growing under Birch, on which tree it usually lives. This insect is an addition to the Irish list; it should perhaps be mentioned that rather large examples of *M. armigera*, Fourc., found in the Santry demesne some years ago were mistaken for *M. carbonaria* and were so recorded. This error was duly corrected in the general list[1] of Irish beetles published in 1902. The discovery of undoubted *M. carbonaria* in Ireland is, therefore, of interest. It is of very local occurrence in Great Britain, ranging from the Midlands of England northwards and becoming more frequent in Scotland where it has been reported from several localities.

Another species which I had long expected to find in the Dublin district is the handsome *Elater praeustus*, F. Two specimens, evidently just emerged from the pupa stage, were dug out of an old Alder stump lying in the partly dry bed of the River Dargle. The identification of the Irish specimens of this Elater seems to need some further enquiry. Meanwhile Mr. Donisthorpe, in dealing with his Kerry captures, has given reasons for referring them to the above-named species.[2] It has been recorded as *Elater pomorum*, Herbst, from several Irish localities and may be found under this name in the Irish list.

Apparently the following species have not been previously recorded from the Dublin district—the longhorn *Rhagium inquisitor*, F., of which a single specimen was captured flying round an oak tree, and the little boring beetle, *Trypodendron domesticum*, L., was very busy in a decayed Alder trunk. A specimen of *Dryophilus pusillus*, Gyll.

[1] *Proc. R.I.A.* (3), vol. vi., p. 817.
[2] *Irish Naturalist*, vol. xxvi., p. 99.

was beaten out of Fir, the only previous Irish records are from Meath and Cavan, where it was recently taken by Dr. Nicholson.[1] The rove beetle, *Stenus bifoveolatus*, Gyll, and *Liodes humeralis*, Kug. a local species, occurred by sweeping plants in a marshy place to the right of the River Dargle. There were also the following species, which are perhaps worth recording :—*Philonthus longicornis* Steph., in the bed of the Dargle ; *Anaitis ocellata*, L., on Larch ; *Choleva tristis*, Panz. ; *Byrrhus pilula*, L. ; *Helodes marginata*, F. ; *Telephorus pellucidus*, F. ; *T. nigricans* var. *discoideus*, Steph. ; and *Deporaus betulae*, L.

A few of the more interesting beetle denizens of the Deerpark were in evidence, notably *Thanasimus formicarius*, L. One was swept from bracken and another was sunning itself on an old Holly tree. *Melanotus rufipes*, Herbst, *Sinodendron cylindricum*, L., and *Rhopalomesites Tardyi*, Curt., were found in their usual habitat—decayed trees. A look-out was kept for the rare ground beetle *Calosoma inquisitor*, seen flying amongst Oak trees many years ago by Tardy ; it still awaits rediscovery.

In other insect orders the most interesting capture was the plant bug *Calocoris striatus*, L., by sweeping plants near oak trees. Mr. Haliday included this fine species in his manuscript list of Irish insects, which is now in the library of the Irish National Museum, and there is a specimen in his collection, but no definite locality was mentioned by him. Early in June, 1916, I found one on Hawthorn flowers at Ardfry, in Co. Galway, and Sir Charles Langham tells me it occurs at Tempo in Fermanagh. The only notable Hymenopteron was the large sawfly *Cimbex sylvarum*, Fab., found on Birch, and referrable to the form with the antennae, tibia, tarsi and the middle segments of the abdomen yellowish—apparently " aberration d " of Cameron.[2] The two-winged flies (Diptera) were represented by a few interesting species, more especially the ichneumon-like *Xiphura atrata*, seen flying heavily at a little distance from the ground, also at rest on trees. I had previously met

[1] *Irish Naturalist*, vol. xxvi., p. 30.

[2] " British Phytophagous Hymenoptera," vol. iii., p. 9.

with this species in a wood near Tullamore in King's County; there was also *Neoitamus cyanurus*, Lw., quite common, but not easy to capture, as it "hawked" after its prey or basked on tree trunks in the hot sun. The Deerpark is in many ways the most interesting locality for woodland insects in the vicinity of Dublin, and in spite of the casual visits of entomologists it is a place which should repay further search.

National Museum, Dublin.

NOTES.

ZOOLOGY.

Mites as guests in Ants' nests.

Many animals belonging to diverse orders are known as welcome "guests" in the nests of various species of ants, yet the economic relationship between the ants and their guests is still obscure. In one of the nests of *Donisthorpea mixta*—near Graiguenamanagh, Co. Kilkenny—referred to above by Mr. Phillips, I found two species of mites belonging to the well known myrmecophilous genera Antennophorus and Urodiscella. My specimen of the former is a male *Antennophorus uhlmanni* Hallen: no species of Antennophorus has been recorded from Ireland before. Mr. Halbert (see Clare Island Survey: Acarinida, *Proceedings Royal Irish Acad.*, vol. xxxi., part 39, p. 92), has taken *Urodiscella philoctena* (Trouess.) in several localities in Ireland in the nests of *D. flava*, but he is not satisfied that my specimen belongs to the same species.

National Museum, Dublin A. W. Stelfox.

Bombus sylvarum in Ireland.

The late Mr. H. Gore Cuthbert frequently recorded a species of Humble Bee under this name, from various localities in Ireland, generally describing it as common.

Mr. C. B. Moffat, however, has proved to me that the bee Cuthbert intended was that known as *Bombus derhamellus*, a closely allied species, though in this country coloured quite differently from *B. sylvarum*. Freke in his list of Irish Hymenoptera Aculeata (*Irish Nat.*, vol. v., 1896), and Sladen in his book on the British Humble Bees (London, 1917) both give Cuthbert's records under the true *B. sylvarum*, the latter stating that *B. sylvarum* is widely distributed in Ireland. Besides Cuthbert's records

for Counties Wexford and Cork, Freke also gives "Portballintrae (Co. Antrim), Rev. W. F. Johnson." A specimen bearing this label stands under *B. sylvarum* in the National Museum and was passed as correctly named by Sladen when he revised the Irish collection of Humble Bees in 1911. The specimen in question is, however, nothing more than a very pale dilapidated worker of *B. agrorum*. How Sladen came to pass it is difficult to imagine. It will be seen, therefore, that the existing Irish records for *B. sylvarum* are all erroneous, and on Mr. Moffat's advice I had decided to withdraw the species from the Irish list, when there arrived by post a beautiful living queen of the true *B. sylvarum* L. This specimen was captured by Mr. R. A. Phillips at Rosslare, Co. Wexford, on the 6th of October last. On this queen, I believe, rests the sole claim of *B. sylvarum* for inclusion in the Irish fauna.

A. W. Stelfox.

National Museum, Dublin.

Helicella heripensis : supposed Occurrence in Ireland.

Helicella heripensis Mabille is a snail closely related to our common H. *intersecta* Poir. (*H. caperata* Mont.). In Great Britain it occurs abundantly in the south-eastern counties, extending its range westward into Wales and northward to Yorkshire. In March, 1920, Prof. A. E. Boycott wrote me saying that amongst the MS. for a new edition of the "Census," left by the late Mr. W. Denison Roebuck, he had discovered an authenticated record for *H. heripensis* for Co. Kildare. Subsequently he found the specimens which he forwarded to me for examination—two "dead" shells (one broken): both typical *H. heripensis*. The label attached to the shells read as follows :—"Camp ground about 3 miles north of Kildare. E. Stainton, 14/3/18. Under stones and débris in a dry ditch. Situation rather dry, but sheltered." The shells were associated in the box with some *Hygromia hispida*, apparently collected at the same time. The label shows Mr. Stainton to have been a careful collector, but on inquiry he was unable to give me any further information about the shells, and apparently was not aware when he collected them to what species they belonged. It is now necessary to ask merely whether two dead shells collected on a camp ground can be taken as proof that the species is native or even lives in Ireland.

Would it not be safer to await confirmation in the shape of living specimens from a more natural piece of ground ? Yet in the Census of the Conchological Society, just published, the shell is definitely recorded for Co. Kildare, so that the record cannot be ignored, though personally I am inclined to regard the Kildare specimen as having been imported from England or the Continent with war stores, possibly fodder for horses.

A. W. Stelfox.

National Museum, Dublin.

Birds of Hillsborough, Co. Down.

In an interesting paper by Nevin H. Foster (*Proc. Belfast Nat. Hist.* and *Phil. Soc.*, 1920-1921) a list of the birds of the neighbourhood of the village of Hillsborough, with notes on the habits and distribution of the different species is given. The district referred to is a small circular area eight miles in diameter with Hillsborough as centre, and situated chiefly in Co Down but partly also in Co. Antrim. The list contains 109 species (exclusive of those whose status is doubtful;, of which 76 have been known to breed in the district, a large number for so small an area. The paper has been mostly compiled from the writer's notes since 1902, and all the available avifaunal records have been consulted and included, so that the list cannot but be regarded as nearly complete. It may be stated that all the specimens of Coal Titmouse obtained in the district are referred in the paper to *Parus ater britannicus*, also that no specimens of *P. a. hibernicus* has been observed although closely looked for, and that no mention is made of the occurrence of an intermediate form. The size and weight of eggs taken in the district are recorded.

What Bats are common?

The difficulty of distinguishing different species of bats on the wing is a cause of much uncertainty as to which species are common in Ireland, and which the reverse. I, therefore, think it well to ask the *Irish Naturalist* to publish the result of a record I have kept of the bats (fifty-five in number) that were brought to me for identification at Ballyhyland since I began paying special attention to these animals. They were as follows:—

Pipistrelle (*Pipistrellus pipistrellus*) ..	37
Long-eared Bat (*Plecotus auritus*)	10
Hairy-armed or Leisler's Bat (*Nyctalus Leisleri*)	6
Whiskered Bat (*Myotis mystacinus*)	2
	55

I think these figures are satisfactory evidence that the Whiskered Bat is much the scarcest of the four species named (at least in County Wexford), and the Pipistrelle considerably the commonest. The Long-eared Bat, however, would have been brought to me more frequently but for the fact that it is so easily recognised and is well known not to be rare. The high-flying habits and strong flight of the Hairy-armed Bat are also probably among the reasons for its being seldom captured. Neither of these considerations will apply to the Whiskered Bat, which flies low, like the Pipistrelle, and in similar situations. Daubenton's Bat, though known to occur in the neighbourhood, was never taken, and is probably still less common than the Whiskered.

C. B. Moffat.

Dublin.

INSECTS AT CARLINGFORD, CO. LOUTH.

BY REV. W. F. JOHNSON, M.A., F.E.S.

I SPENT June, 1921, at Carlingford, and was much disappointed at the results of my search for insects there. The prevailing winds were easterly, and the sun was often obscured by cloud; these conditions were unfavourable to my collecting, as my attention was especially directed to the Hymenoptera, and they are creatures which, in the main, only move about in sunshine. Another cause of lack of insects was the drought, which set in at the latter part of May. It seemed not only to dry up the ground, but the insects also. I suspect a good many were unable to emerge owing to the hardness of the earth. It was only by diligent collecting at favourable opportunities that I was able to get together the insects noted below. My best locality was a field path running from what is called the Blind Lane to the Greenore Road. The pathway was along the hedge, and this contained the usual miscellaneous assortment of bushes and plants, and at one part had quite a quantity of Bracken fern growing on it.

I walked to Greenore one day, hoping to meet with some Aculeata, but just took two and a Dipteron, not very encouraging after tramping four miles along a dusty road; I need scarcely say I did not go back again.

Among the Butterflies I met with only the common species, except the Painted Lady, of which two battered specimens made their appearance at the end of the month. I was very pleased to meet with the beautiful White Plume Moth, *Aciptila pentadactyla*, though I only got a single specimen. I had not met with it since I took it in numbers at Rosses Point in 1905.[1] I knocked it up one afternoon on the field path. *Ennychia cingulata* occurred on the lower slope of the mountain; I only met with one specimen. I was surprised that I did not see any moths in the evening

[1] *Irish Naturalist*, xiv., 1905, p. 252.

at the Red Valerian, which grows so abundantly on the old walls at the castle and elsewhere. Possibly if I had gone out about midnight (summer time) I might have seen some, but being no longer young I preferred to go to bed. I picked up a few Diptera, mostly, it will be seen, belonging to the Syrphidae, for that is the section I am best acquainted with. I give *Catabomba selenitica* and *Syrphus labiatarum* with some reserve, as they are somewhat critical species and I have no types. Among the Stratiomyidae are some very beautiful flies, *e.g.*, *Odontomyia viridula* in green and black, and *Chloromyia formosa* in most brilliant shining green. Its furry body gives *Bombylius canescens* a very remarkable appearance.

I had hoped to get a good many Aculeata, but the meagre list presented tells the tale of my disappointed hopes. I think that the fine warm weather of May had brought them on earlier than usual, so that most were over when I arrived on the scene. The wet season of last year undoubtedly helped to reduce their numbers, for I did not see anything like the usual number about Poyntz-pass.

The most plentiful bee was *Andrena fucata*, especially males; they were all over the place, and I kept catching them, only to find that I had got what I did not want. I got a few *A. nana*, a species I had not met with before, and which, so far as I know, has only been recorded from the extreme south of Ireland (Cork and Kerry).

I did much better with the Sawflies, though I was, of course, too late for the early spring species. Most of these were taken along the field path, but *Pachyprotasis rapae* was captured on the old Omeath road in a rather peculiar manner. First one flew on to Mrs. Johnson's dress, and, as she had not her net with her, she called to me, and I duly captured it. Three days later we were strolling along the same road, from which there were very beautiful views up and down the lough, when Mrs. Johnson pointed out to me a Sawfly sitting on a frond of Bracken; I duly captured it, and it proved to be a second specimen of this species. My best capture was *Amauronematus viduatus* Zett., a

species which is not mentioned by Cameron,[1] but which, according to Konow,[2] ranges through middle and northern Europe to Mongolia and Siberia. Quite a number of *Selandria stramineipes* occurred among Bracken along the field path, but I could only get females. I hoped at first that I had got *S. analis*, but found I was mistaken.

Rhogogaster aucupariae and *Tenthredopsis Coquebertii* were abundant, and *Allantus arcuatus* and *A. Perkinsi* were beginning to appear before I left. As most of my attention was given to the Ichneumon Flies, their list is naturally the longest. I was greatly delighted to capture a second specimen of *Euryproctus* (*Hypamblys*) *buccatus* Hlgr. I took it on June 7th, in the afternoon between 3 and 5 p.m. My notebook says, "hot sun, cold wind, not much about." This specimen is a male; the one I took at Poyntzpass[3] was a female.

The *Stenichneumon culpator* which I took is entirely black, but being a female, the coxal processes identify it, and Morley[4] mentions such a form. *Amblyteles subsericans* is an uncommon form, having the scutellum entirely black. It will be noticed that my list of Pimplinae is very short, but they seem not to appear so early. I always get plenty of them in July and August, and even later. Among the Tryphoninae *Bassus variicoxa* occurred in numbers at a bed of thistles on the shore. Probably they were attracted by Syrphid larvae feeding on the Aphides which infested the thistles. *Catoglyptus fortipes* was very abundant, flying among the Bracken along the field path, in fact I got quite to know their flight and so avoid catching them.

I only met with one solitary Braconid, *Meteorus jaculator*, of which I captured a male on the field path.

COLEOPTERA.

Otiorrhynchus ligneus Ol. Cionus scrophulariae L.

---

[1] "Monograph of British Phytophagous Hymenoptera."

[2] Wytsman's "Genera Insectorum," Tenthredinidae.

[3] *Irish Naturalist*, xxix., 1920, p. 19.

[4] "British Ichneumons," vol. i., p. 43.

LEPIDOPTERA.

Pieris brassicae.
P. rapae.
P. napi.
Euchloe cardamines.
Vanessa urticae.
Pyrameis cardui.
Pararge egeria.
P. megaera.
Epipnephele janira.
Chrysophanus phlaeas.
Polyommatus icarus.
Anaitis plagiata.
Amoebe (Larentia) viridaria.
Aciptila pentadactyla.
Ennychia cingulata.

DIPTERA.

Syrphidae.

Pipiza noctiluca L.
P. notata Meig.
Chrysogaster calybeata Meig.
Chilosia variabilis Panz.
Platychirus albimanus Fab.
Catabomba selenitica Meig.
Syrphus ribesii L.
S. labiatarum Verrall.
Baccha obscuripennis Meig.
Chrysotoxum bitinctum L.
Syritta pipiens L.
Sericomyia borealis Fallen.

Stratiomyidae.

Oxycera trilineata Fab.
Stratiomys furcata Fab.
Odontomyia viridula Fab.
Chloromyia formosa Scop.

Bombylidae.

Bombylius canescens Mikan (female, taken at Greenore).

HYMENOPTERA.

Tenthredinidae.

Dineura testaceipes Kl.
Pontania vesicator Bremi.
Amauronematus viduatus Zett.
Pachynematus vagus F.
Athalia lineolata Lep.
Selandria stramineipes Kl.
Thrinax macula Kl.
Strongylogaster cingulatus F.
Empria (Poecilosoma) pulverata Retz.
Dolerus picipes Kl.
D. aeneus Hartig.
Rhogogaster aucupariae Kl.
Tenthredopsis Coquebertii Kl.
T. palmata Geoff.
T. gibberosa Knw.
T. tiliae Panz., var. inornata Knw.
T. tiliae Panz., var. dorsata[1] Knw.
Pachyprotasis rapae L.
Allantus arcuatus Foest.
A. Perkinsi Morice.
Tenthredella livida L.
T. moniliata Kl.

[1] I have worked out the last four species according to Mr. Morice's Tables in his "Help Notes."

ACULEATA.

Pemphredon lethifer Shuck.
Crabro dimidiatus Fab.
Halictus fulvicornis K.
Andrena jacobi Perkins, var. scotica Perkins.
A. fucata Sm.
A. nana K.
A. wilkella K.
Nomada goodeniana K.
N. ruficornis L. (also at Greenore).
N. flavoguttata K.
Psithyrus barbutellus Fourcrier (Greenore).

ICHNEUMONIDAE.

Stenichneumon culpator Schr.
Cratichneumon sicarius Gr.
C. fabricator F.
Barichneumon albicinctus Gr.
Ichneumon suspiciosus Wesm.
I. caloscelis Wesm.
I. computatorius Mull.
I. subquadratus Thoms.
Amblyteles subsericans Gr.
Dicaelotus rufilimbatus Gr.
Alomyia debellator Fab, type and var. nigra Gr.
Microcryptus arrogans Gr.
M. brachypterus Gr.
Glyphichnemis profligator Fab.
Phygadeuon rufulus Gmel., var. afflictor Gr.
P. brevitarsis Thoms.
P. inflatus Thoms.
Exolytus laevigatus Gr.
Pycnocryptus peregrinator L., and var. analis Gr.
Cryptus albatorius Vill., var. titubator Thnb.
Goniocryptus plebejus Tschek.
Pimpla arctica Zett.
P. turionellae L., also var. rufitibia Morley, and strigipleuris Thoms.
P. maculator Fab.
P. oculatoria Fab.
Phytodiaetus coryphaeus Gr.
Exochus prosopius Gr.
Bassus variicoxa Thoms.
Homocidus biguttatus Gr.
H. pectoratorius Gr.
H. tarsatorius Panz.
H. dimidiatus Schr.
H. pictus Gr.
Mesoleius virgultorum Gr.
M. rufonotatus Hlgr.
M. dorsalis Gr.
M. ignavus Hlgr.
Catoglyptus fortipes Gr.
Euryproctus (Hypamblys) buccatus Hlgr.
Polyblastus variitarsus Gr.
P. sphaerocephalus Gr.
P. pastoralis Gr.
Campoplex erythrogaster Forst.
Sagaritis Holmgreni Tschek.
Casinaria ischnogaster Thoms.
Omorga mutabilis Hlgr.
O. multicincta Gr.
Olesicampa fulviventris Gmel.
Angitia insectator Schr.
A. rufipes Gr.
A. fenestralis Hlgr.
Anilasta ruficincta Gr.
Mesochorus fulgurans Curt.

BRACONIDAE.

Meteorus jaculator Hal.

Killincoole, Co Louth

IRISH SPHAGNA.

BY WILLIAM A. LEE.

When the late Canon Lett read his Census Report on the Mosses of Ireland before the Royal Irish Academy in 1914 his list of Sphagna, named chiefly with reference to Dr. Braithwaite's "Sphagnaceae of Europe and North America," included, in all, 42 species and varieties. Since that time there has been much controversy as to classification and nomenclature in this group, which even yet is not ended. The practical field-worker has the choice of retaining the older nomenclature, with the disadvantage of hearing disparagements from competent systematists as to the usefulness of his lists, or he may accept a more recent system with the closer application and more minute study which its use involves. In a paper read before the Liverpool Botanical Society in 1917, Mr. J. A. Wheldon, F.L.S., gave a valuable contribution on the "Collection, Taxonomy, and Ecology of the Sphagna," which was afterwards extended and reprinted from the *Lancashire and Cheshire Naturalist* in March, 1918. The attitude of this experienced sphagnologist is embodied in a brief quotation here given, which probably expresses the views of many other workers in the same group:—"The numerous forms and varieties recognised by Continental sphagnologists were regarded with disfavour for a long time in this country (England), and even now only receive tardy and partial recognition. I hold no brief for the defence of the Warnstorfian system; it has some defects and many inconsistencies. But, like the Linnean system of classifying Flowering Plants, it is of practical utility, and provides a niche and a name for the vast number of forms that are met with. It is therefore, a useful starting point from which a more perfect system eventually may be evolved when the true affinities and range of variation in species are better understood." The *Synopsis of the European Sphagna*, compiled for the Moss Exchange Club by Mr. Wheldon, contains a number of Irish records; but so far as can be ascertained no separate

list of Irish Sphagna, named on the Warnstorfian system, has hitherto been published. The desirability of having such a working record is obvious, and, although the material for its preparation is as yet scanty, perhaps the contemplation of its blanks may prove an incentive to Irish bryologists to make further additions. No botanist whose attention has once been directed to the singular beauty of Sphagna, either in the field or under the microscope, will be likely to forego the pleasure and interest to be derived from their study. Mr. Wheldon, who has examined many Irish specimens, speaks of the possibility of very considerable additions, both to the number of records and the knowledge of the life history of the group, and remarks (*in lit.*) that "the situation of Ireland, its longer isolation from the Continent, its peculiar climate, and certain differences which distinguish its higher flora from that of the larger island, all point to the probability of interesting results from a careful exploration of the Sphagna. The lowland bogs, now very rare in England, should be especially and carefully investigated, from which valuable observations are to be anticipated."

The subjoined list is based mainly on specimens identified by Mr. Wheldon, to whom I am much indebted for his courtesy in assisting me in the preparation of this record, and permission to make use of his material. In every instance in which a collector's name is given, Mr. Wheldon has seen and examined a specimen. The records without detailed authority have been collected from published lists by him, and are regarded as probably reliable. In the case of a few of the old collective names such as "*S. acutifolium*," "*S. subsecundum*," etc., it would be desirable to have them verified.

S. fimbriatum Wils.—20, 30 (Tetley), 33(Tetley), 34, 35 (Hunter), 39.
var. **intermedium** Russ.—34 (Lee).
var. **tenue** Grav.—38 (Waddell).
S. Girgensohnii Russ.—20, 34, 38 (Lett and Waddell), 39.
S. Russowii W.—34, 39.
S. fuscum v. Klinggr.—1 or 2 (Knight), 18, 32, 33 (Tetley), 34, 39.
var. **medium** Russ.
f. **fuscescens,** sub-f. **drepanocladum** W.—18 (Lett).
sub-f. **heterocladum** W.—39 (Lett).

S. rubellum Wils.—1-3, 6-8, 16-18, 20, 21, 27, 28, 30, 31, 33-39.
var. **viride** W.—34 (Lee).
var. **violascens** W.—18 (Lett.).
var. **flavum** Jens. ap. W.
f. **pallescens** W.—34 (Lee).
var. **purpurascens** Russ.—2 (Gasking), 28 (Lee), 34 (Lee).
var. **versicolor** W.—27 (West), 28 (Lee), 34 (Lee), 36 (Lett).
f. **immersum** Schlieph.—34 (Lee).
S. acutifolium Ehrh.—16, 18, 27, 33, 35, 37, 38 (Lett).
var. **viride** W.
f. **heterocladum** W.—28 (Lee).
var. **pallescens** W.—38 (Lett).
f. **alpinum** W.—38 (Lett).
var. **rubrum** Brid.—28 (Lee).
var. **versicolor** W.—28 (Lee).
var. **flavo-rubellum** W.—28 (Lee).
var. **flavescens** W.—Kerry 1 or 2 (Moore).
S. quinquefarium W.—1-3, 6-7, 14, 16, 27, 29, 33-36, 38-39.
var. **viride** W.—1 (Gasking), 28 (Lee).
var. **roseum** W.—Kerry 1 or 2 (Lett).
f. **speciosum** W.—Kerry 1 or 2 (Lett).
var. **versicolor** Russ.—28 (Lee), 37.
f. **homocladum** Russ.—28 (Lee).
S. plumulosum Roll., emend. W.—1-3, 6-8, 12-13, 15-16, 18, 25-27, 28, 30-31, 33-39.
var. **viride** W.—1 (Gasking), 28 (Lee), 38 (Lee).
f. **squarrosulum** W.—1 (Gasking).
f. **laete-virens** W.—28 (Lee).
var. **pallens** W.
f. **pungens** Wheldon—34 (Lee).
var. **coerulescens** Schlieph—37 (Houston).
var. **lilacinum** Spruce in Herb. Stabler.
f. **orthocladum** W.—38 (West).
f. **compactum** W.—1 (Gasking), 28 (Lee), 34 (Lee), 38 (West).
f. **delicatum** Wheldon—34 (Lee).
var. **purpureum** W.—28 (Lee).
f. **gracile** W.—34 (Lee).
var. **versicolor** W.—1 or 2 (West), 28 (Lee), 34 (Lee), 37 (Houston), 38 (Lett).
f. **validum** W.—34 (Lee).
f. **tenellum** W.—34 (Lee).
var. **flavofuscescens** W.—38 (Lett).
var. **ochraceum** W.—1 (Gasking), 38 (Lett).
f. **immersum** W.—31 (Lett).
var. **carneum** W.—37.
S. molle Sull.—34, 35, 37, 39.
var. **molluscoides** W.
f. **tenerum** W.—Connemara, 1871. (C. Purphrey in Herb. Birmingham, sub. nom. *S. molluscum*).

S. compactum DC.—2, 20, 21, 27, 28, 31-35, 37-39.
var. **squarrosum** Russ.—37 (Lett), 27, 31, 33, 35. (Not seen by me.—J. A. W.).
var. **subsquarrosum** W.—27 (West), 31, 35, 37 (Houston).
f. **densum** W.—28 (Lee).
var. **imbricatum** W.—1 (Gasking), 16, 27, 31, 36-38, 39.
f. **purpurascens** W.—27 (West).
f. **flavescens** Wheldon—37 (Houston)..
S. squarrosum Pers.—2, 4, 5, 7, 8, 13, 16, 20-22, 27, 31, 33-34, 36, 37-39.
var. **spectabile** Russ.—7, 8 (Lett.), 33-34, 36-37, 39.
var. **subsquarrosum** Russ. ap. W.—27 (Waddell), 33 (Lett), 37, 39.
f. **elegans** Russ.—38 (Lett).
var. **imbricatum** Schimp.—8, 38.
S. teres Angstr.—20, 34, 37, 38, 39.
var. **subteres** Lindb.—37, 38, 39 (Lett).
S. amblyphyllum Russ.—1 (Gasking), 6, 7, 28 (Lee), 39 (Lett).
var. **mesophyllum** W.
f. **sylvaticum** Russ.—1 (Gasking), 28 (Lee).
var. **parvifolium** W.—39.
S. pulchrum W.—3, 31, 34, 38 (Lett).
var. **fuscoflavens** W.
f. **brachyhomalocladum** W.—38 (Lett).
S. recurvum P. de Beauv—6, 7, 27, 35, 37-39.
var. **majus** Angstr.
f. **silvaticum** Russ.—34 (Lee).
var. **parvulum** W.
f. **viride** W.—34 (Lee).
S. cuspidatum Ehrh.—1, 2, 7, 8-14, 16-18, 20, 21, 25-29, 30, 31-34, 35, 36-40.
var. **falcatum** Russ.—1, 2, 8, 11 (Tetley), 13 (Tetley), 14, 17 (Tetley), 18, 20 (Moore), 25-27, 29 (Tetley), 30 (McArdle), 32 (Kane), 33 (Lett), 35, 38 (Lett), 39.
f. **molle** W.—18 (Lett), 27 (West), 34 (Lee).
sub-f. **capitatum** Wheldon—1 (Gasking).
sub-f. **polyphyllum** W.—27 (West).
f. **rigidum** W.
sub-f. **pungens** Grav.—34 (Lee).
var. **submersum** Schimp.—1. (Lett), 8, 18, 27, 33, 34 (Lee), 35, 36-39.
f. **crispatum** W.—37 (Houston).
f. **rigescens** W.—37 (Houston).
sub-f. **robustum** W.—37 (Lett), 38 (Waddell).
var. **plumosum** Schimp.—14 (Tetley), 20, 26 (Tetley), 28 (Tetley), 33, 37-39.
S. molluscum Bruch.—1, 2, 6, 14 (Tetley), 16, 18, 20, 21, 26 (Tetley), 27, 28 (Tetley), 30 (Lett), 32 (Bingham), 33-35, 36 (Stewart), 37-39.
var. **vulgatum** W.
f. **compactum** W.—28 (Lee), 39 (Lett).

S. Holtii W.—[2 (West.) somewhat doubtful].

S. obesum (Wils) W.—14 (Tetley), 17 (Tetley), 21 (Hutton), 26, 27, 30 (Tetley), 33 (Tetley), 35 (Glover), 37, 38, 40 (Lett).
var. **canoviridis** W.—(37 doubtful).

S. subsecundum Nees.—37, 38. (I have not myself seen this from Ireland. —J. A. W.).

S. inundatum R. et W.
var. **ovalifolium** W.
f. **brachycladum** W.—1 (Gasking).
f. **densum** W.—25 (Houston), 28 (Lee).
var. **diversifolium** W.—1 (Gasking).

S. auriculatum Schimp.
var. **ovatum** W.
f. **variegatum** W.—28 (Lee).

S. aquatile W.—38.

S. contortum Schultz—3, 6 (Lett), 8 (Armitage), 20 (Davies), 21 (Orr), 28 (Tetley), 29 (Tetley), 31 (Lett), 39 (Lett), 34, 35 (Hunter), 38, 39.

S. crassicladum W.—6, 17 (Tetley), 25 (Tetley), 27 (Lett), 30 (Bellerby), 33 (Tetley), 35, 38.
var. **magnifolium** W.
f. **fluctuans** W.—17 (Tetley).
f. **lonchocladum** W.—34 (Lee).
var. **diversifolium** W.—37 (Houston).
var. **intermedium** W.—2 (West), 37 (Houston).

S. rufescens Nees et Hornsch—30 (Tetley).
var. **magnifolium** W.—1, 6, 8, 12, 16, 27, 28, 30, 33, 36-39.
f. **bicolor** W.
sub-f. **intortum** W.—37 (Houston).
f. **virescens** W.—28 (Lee).
var. **parvulum** W.
f. **densissimum** W.—28 (Lee).

S. imbricatum Russ.—18.

S. papillosum Lindb.—1, 2 (West)—7, 13, 16, 18, 20, 27, 33, 34 (Lee), 37-39.
var. **normale** W.—1, 2 (West), 20 (Lett), 27, 38, 39 (Lett).
f. **majus** Grav.
sub-f. **elegans** Wheldon—34 (Lee).
f. **brachycladum** W.
sub-f. **pallescens** Wheldon—1 (Gasking).
sub-f. **flavofuscum** Wheldon—34 (Lee), 38 (West).
f. **confertum** W.—20 (Lett).
sub-f. **pallidum** Wheldon—34 (Lee).
sub-f. **fusculuteum** Wheldon—1 (Gasking), 27 (West), 38 (West), 39 (Lett).
var. **sublaeve** Limpr.—1 (Gasking), 28 (Lee).
f. **validum** W.
sub-f. **submersum** W.—1 (Gasking).

S. cymbifolium Ehrh.—1-4, 7, 8, 12, 13, 15-21, 27-29, 31-35, 37-39.
var. **glaucescens** W.—1 (Gasking), 37 (Houston).
f. **squarrosulum** Pers.
sub-f. **pycnocladum** W.—37 (Houston).
f. **brachycladum** W.—28 (Lee).
var. **pallescens** W.—34 (Lee).
f. **laxum** W.—34 (Lee).
f. **confertum** Wheldon—2 (West), 25 (Houston), 34 (Lee).
var. **flavescens** W.—2, 37 (Houston), 38 (Lett).
var. **fuscescens** W.—37 (Houston), 38 (West).
S. subbicolor Hampe.—1, 27. (I have not seen Irish examples.—J. A. W.).
S. medium Limpr.—1, 3, 8, 9, 10, 18, 25 (Houston) 27 (West), 30, 33-35, 37, 38.
var. **obscurum** W.—37 (Houston).
var. **roseum** W.—27 (West), 34 (Hunter), 37 (Lett).
f. **abbreviatum** W.—27 (West).
var. **purpurascens** W.—25 (Houston), 27 (West).
var. **versicolor** W.—37 (Houston).
f. **brachyorthocladum** Wheldon—28 (Lee).

Rock Ferry, Cheshire.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 11.—The Club met at Leinster House. P. A. MURPHY showed the formation of "secondary" conidia by the germinating zoospores of *Phytophthora infestans*, the Potato Blight fungus. This observation, which has not been previously recorded, is believed to be of considerable importance in prolonging the existence of the fungus in the soil and in facilitating tuber infection.

Dr. G. H. PETHYBRIDGE exhibited "seeds" (mericarps) of Sheep's Parsley (*Petroselinum sativum*), on the surface of which perithecia of the common powdery mildew (*Erysiphe Polygoni*) were present in abundance. Salmon, in his Monograph of the powdery mildews, states that this species is found on no less than 602 different hosts, but Sheep's Parsley does not appear to be one of them, and must therefore now be added to the list. Examples of seeds carrying parasitic fungi either on their surfaces or in their tissues are, owing to the investigations of recent years, better known now than was formerly the case, but the exhibitor had not previously met with any instance in which a powdery mildew was carried by seeds. It would seem probable that the mildew might be distributed over considerable distances in this way, especially seeing that the sample of seed was a commercial one; but actual proof that such seed when sown would give rise to plants which become mildewed has not yet been obtained.

BELFAST NATURALISTS' FIELD CLUB.

November 16.—W. Bulla lectured on "The Art of Burial," referring especially to prehistoric custom as exemplified in Ireland. A discussion followed in which the President (S. A. Bennett), A. McI. Cleland, and Rev. Canon Carmody took part. Thirteen new members were elected.

January 20.—E. A. Armstrong, B.A., delivered a lecture on the subject, "At home with Fur and Feather." The chair was occupied by the Vice-President (Rev. W. R. Megaw, B.A.), who, before introducing the lecturer, referred to the recent losses the Club had sustained through the deaths of Joseph Malcolmson and E. F. Green, votes of condolence being passed to the relatives of both families.

The lecturer first explained some of the difficulties of bird photography, and showed how it was possible, even with the most unsuitable apparatus, to obtain good photographs of birds and animals in the wilds. He then referred to camping as an aid to nature study, and explained how, by living amongst the wild things, sleeping in the open or in a small tent, the naturalist may learn the ways of nature and have opportunities of effectively photographing birds and animals. He then asked the audience to accompany him, first round his home, and then farther afield to the mountains, to Lough Neagh's banks, to Strangford Lough, and through the depths of Epping Forest, seeing and hearing the various wild creatures to be found in these localities. The lecture was illustrated by coloured lantern views from the lecturer's own photographs; also by records of the songs of birds. A discussion ensued, in which the Vice-President, J. A. S. Stendall M.B.O.U., J. Loughbridge, H. Coey, and J. Holness took part.

NOTES.

ZOOLOGY.

Some Irish Collembola.

A paper on Irish Springtails by John W. Shoebotham which was published in the *Ann. Mag. Nat. Hist.* (8) vol. xiii., 1914, has not yet been referred to in this Journal. During the author's several visits to Ireland he succeeded in obtaining four species, viz., *Achorutes manubrialis*, *Tullbergia Krausbaueri*, *Lepidocyrtus albus* and *Megalothorax minimus* which had not previously been obtained in this country.

THE LARVAL MOUTH-HOOKS OF HYPODERMA.

BY GEOFFREY PHIBBS.

THE larvae of the two species of warble fly, *Hypoderma bovis*, De Geer, and *Hypoderma lineatum* (Vill) have long been known to pass through four stages before pupation. With the recent demonstration by E. W. Laake (4) of the Bureau of Entomology, United States Department of Agriculture, that two distinct stages are included in what had previously been known as the "second" instar, five stages, at least must be recognised in the larval history of the "warble-flies." Laake points out that the second instar has rows of minute spines on the segments, while the third is entirely smooth except for the spines at the mouth and those on the tail segment. He is mistaken, however, in supposing that his second stage larva "has not been recognised before." It was briefly described and roughly figured by Carpenter and Prendergast (1) in 1909. I am greatly indebted to Mr. Laake for generously sending beautifully mounted specimens of American larvae of Hypoderma in these two stages.

When newly hatched from the egg the young Hypoderma larva is, perhaps, less than one-thirtieth of an inch long. At the end of the fifth stage when nearly ready to pupate it may be over an inch in length, and half an inch in diameter. Between the first stage and the last the mouth parts undergo considerable modification.

In the newly hatched larva the mouth armature is very conspicuous and relatively large. In the first stage, as also in the second (Figs. 1, 2, and 3) and third stages, it consists of a horny somewhat lozenge-shaped spine (*p. s.*) situate between, and in the same plane as the two chitinised mouth-hooks (*h*). These hooks lie with their backs to the central spine and with their tips coming to a level with its extremity. On either side of the base of the spine, which projects backwards some way beyond the hooks, is the beginning of a long oar-like pharyngeal sclerite (*ph. s.*). These two sclerites, narrow near the mouth and broadening towards their bases may be nearly a quarter as long as the

entire maggot ; in fact the mouth parts in the first stage are not only relatively but also actually larger than in any

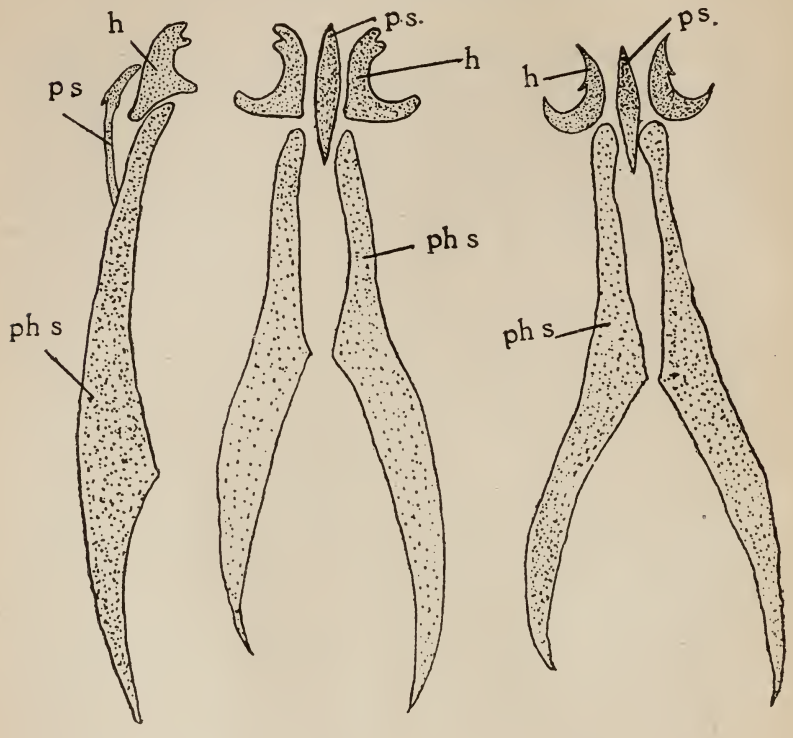

Fig. 1. Fig. 2. Fig. 3.

Fig. 1.—*Hypoderma bovis*, second-stage larva, mouth armature, side view, × 240.

Fig. 2.—*H. bovis*, second-stage larva, mouth armature, dorsal view, × 240.

Fig. 3.—*H. lineatum*, second-stage larva, mouth armature, dorsal view, × 240.

h. mouth hooks ; *ph. s.* pharyngeal sclerite ; *p.s.* parastomal sclerites.

other stage. Laake has pointed out, in the paper above referred to, that in the first stage larvae the most conspicuous distinguishing feature between the two species is to be found in the shape of the mouth-hooks. " The forked

anterior end and the blunt rear end of the mouth-hook of *H. bovis* are so distinctly different from the sharply pointed anterior end with a well-formed tooth some distance below and the slightly pointed rear end of the hook of *H. lineatum* that the two species can be separated almost at sight in the first instar." Laake's observations of the second instar were made on specimens of *H. lineatum* only. From an examination of several specimens of *H. bovis*, taken from the gullets of Irish cattle, it is clear that this distinction is equally evident in the second stage.

Speaking of the mouth parts of the first stage larva Carpenter and Hewitt (2) say—" We find that in *H. bovis* the mouth-hooks articulate directly with the pharyngeal sclerites, the paired hypostomal sclerites that intervene in most half-grown or full-grown muscoid larvae not being present; according to Lowne these sclerites are not recognisable in the Blow-fly maggot till after the second moult, so that their absence in the young warble-maggot might have been expected."

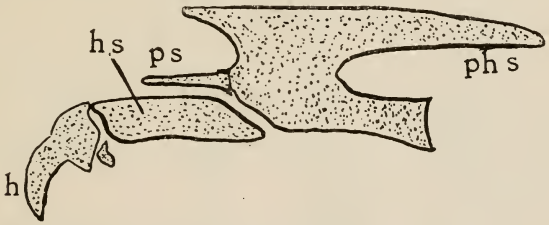

Fig. 4.—*Calliphora sp.*, mature larva, mouth armature, side view, × 40. *h*, mouth hook; *ph. s.* pharyngeal sclerite; *p.s.* parastomal sclerite; *h.s.* hypostomal sclerite.

The paired parastomal sclerites which are present in most muscoid larvae, that of the blue bottle, Calliphora (Fig. 4, *p. s.*) for example are well represented in all the larval stages of Hypoderma by the central spine (Figs. 1, 2, 3 *p. s.*) previously mentioned. The mouth-parts of the second larval stage as also of the newly discovered third stage do not differ noticeably from those of the first stage except that in respect of size they are somewhat *smaller*. It is after the third moult that considerable modification is

found. In the fourth stage (Fig. 5) larva the anterior ends of the hypostomal sclerites (*h.s.*) have become fused together forming a comparatively wide chitinous band on the lower lip or ventral aspect of the mouth.

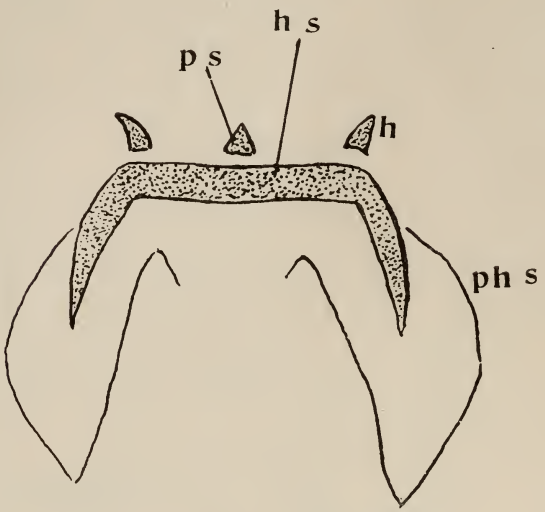

Fig. 5.—*Hypoderma bovis*, fourth-stage larva, mouth armature, ventral view, × 100.

h, mouth hook; *ph. s.* pharyngeal sclerite; *p.s. parastomal sclerites*; *h.s.* hypostomal sclerite.

The pharyngeal sclerites (*ph. s.*) have largely lost their opaque horny structure and have become a pair of wide almost transparent plates. The mouth-hooks (*h*) themselves have become greatly reduced in size and are further removed from the central spine (*p. s.*) the sclerites composing which have become more closely fused together. All the mouth parts have both relatively and actually undergone a great diminution of size.

It is in the fifth and final larval stage that the greatest change is noticeable (Fig. 6). Each of the pharyngeal sclerites (*ph. s.*) has become very broad with its outer margins forming almost a semicircle. Their appearance now is that of two wing-like outgrowths from the wall of the gullet,

The fused hypostomal sclerites (*h. s.*) have also become more massive ; they are much shorter and no longer project over the pharyngeal sclerites. The actual mouth hooks have entirely disappeared though the central spine (*p. s.*) is slightly larger in this than in the fourth stage.

In connection with this absence of the mouth-hooks in the fully-grown larva N. Joly (3) writing in 1846, says :— " Indépendament des nombreux caractéres qui peuvent déjà nous servir a différencier la larve de l' *Hypoderma bovis* d'avec les larves gastricoles ou cavicoles il en existe un autre plus essentiel peut-être : je veux parler de l'absence des crochets mandibulaires. Ici, en effet, la

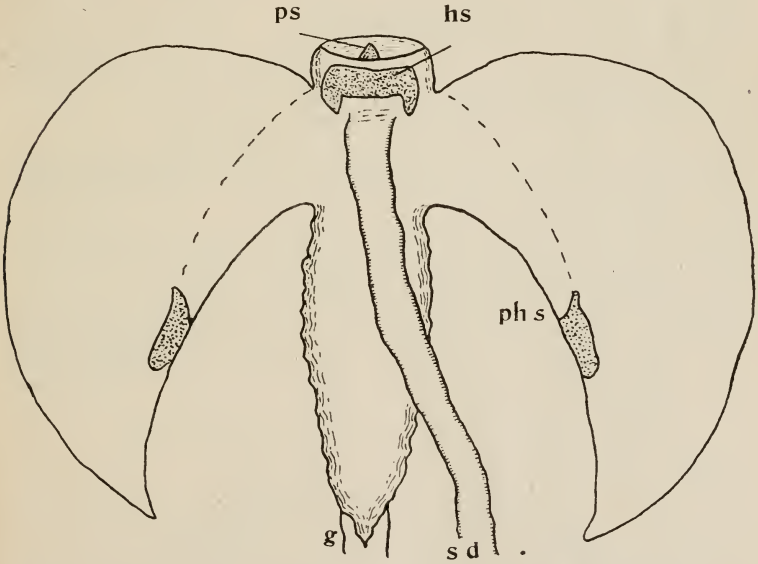

Fig. 6.—*H. bovis*, fifth-stage (mature) larva, mouth armature, ventral new, × 50.

ph. s. pharyngeal sclerite ; *p.s.* parastomal sclerites ; *h.s.* hypostomal sclerites ; *g.* gullet ; *s.d.* salivary duct.

bouche consiste en une simple ouverture, extrêmement petite, et très-difficile à mettre en évidence chez l'insecte vivant."

There has been some doubt expressed as to the accuracy of the statement that there are no mouth-hooks in the

mature larva, but it seems that Joly was essentially right, though his statement that the mouth is "extrêmement petite" is hardly justifiable; relatively it is not remarkable for its smallness. The difficulty of observing it in the living insect is due to its situation in a fold of cuticle. The disappearance of mouth-hooks is not surprising when it is considered that the insect in its final larval stages no longer requires strong jaws for piercing its way through the tissues of its host, and that any food taken by the full grown larva is of an entirely fluid nature.

Royal College of Science, Dublin.

REFERENCES.

1. G. H. Carpenter and W. F. Prendergast.—"The Warble-flies: Further Experiments as to Life-history and Treatment." *Journ. Dept. Agric. and Tech. Instr., Ireland,* vol. ix., No. 3, 1909.

2. G. H. Carpenter and T. R. Hewitt.—"Reproductive Organs and Newly Hatched Larva of the Warble Fly." *Sci. Proc. R. Dublin Soc.*, vol. xiv., 1914.

3. N. Joly.—"Recherches sur les Oestrides." *Annales de la Société Royale d'Agriculture,* Lyon. Tome ix., 1846.

4. E. W. Laake.—"Distinguishing Characters of the Larval Stages of the Ox-Warbles Hypoderma bovis and H. lineatum, with description of a New Larval Stage." *Journal of Agricultural Research,* Washington, vol. xxi., July, 1921.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Leopard from Mr. R. H. Ellis, a Spotted Hyaena from Dr. E. B. Bate, a Badger from Mr. A. B. A. Cottingham, Hedgehogs from Messrs. E. M. Robinson and T. McWilliams, a Belgian Hare from Mrs. Sharman Crawford, a pair of Blue Rabbits from the Misses Smith, Rabbits from Mr. J. A. Lewis, Rabbits and Guinea-pigs from Lt.-Col. J. C. Craster, Hooded Crows and Jays from Mr. W. W. Despard, Barn Owls from Mrs. McNaboe, Dr. R. de C. Wheeler and Mr. T. Grieve, a Sulphur-crested Cockatoo from Miss P. M. Byrne, a Roseate Cockatoo from Mrs. Church, a Blue-fronted Amazon from Mr. J. N. Colles, eleven Tumbler Pigeons from Mr. H. Mayston, Japanese Silky Fowl from Mr. J. A. Scott, Game Bantam and Silky Fowl from Dr. R. R. Leeper, a

Pheasant from Miss J. Stronge, a Peregrine Falcon from Mr. R. E. Longfield, Sparrow Hawks from Dr. R. R. Leeper, Mrs. Bagster and Mrs. Brady, Kestrels from Mr. W. W. Despard and Mr. T. Grieve, two Diamond Pythons, a Boa and two Blue-tongued Skinks from a member of Council, and 8,000 Salmon Ova from the Irish Fisheries Office. A Rhesus, and a Kra Monkey and a Roseate Cockatoo have been deposited, and a pair of Silver Pheasants received in exchange. A Bison Calf has been born.

Among recent purchases are a second young male Chimpanzee, two Sooty Mangabeys, two Lion Marmosets, a Raccoon, a Badger, a Crested Porcupine, three Ariel Toucans, a Patagonian Conure, six Quaker Parrakeets, a Bantam Game Cock, four Guinea-fowl, two Bateleur Eagles, and a Martial Hawk Eagle. A valuable consignment of Australian animals form an especially noteworthy purchase, including pairs of Woodward Kangaroos, Black-striped Wallabies, Black Wombats, Phalangers, Wedge-tailed Eagles, Lilac-crowned Pigeons, and Yellow-bellied Fruit Pigeons. A healthy young Kangaroo has been born since the arrival of these animals.

DUBLIN MICROSCOPICAL CLUB.

February 8.—The Club met at Leinster House, the President in the chair.

J. N. Halbert exhibited a new acarid belonging to the genus Rhaphignathus found recently under stones amongst heather on Howth Head. The species is a remarkable one on account of its very small size, the sculpturing of the epidermis, and the presence of beautifully pectinated hairs on the body in which it differs from all the known species of the genus.

BELFAST NATURALISTS' FIELD CLUB.

January 17.—J. A. S. Stendall, M.B.O.U., gave a lecture on Spiders. The chair was occupied by the President (S. A. Bennett, B.A., B.Sc.), who, before introducing the lecturer, proposed that J. K. Charlesworth, M.Sc., Ph.D., F.G.S., and R. J. Welch, M.R.I.A., should be transferred to the class of honorary members, this proposal being unanimously adopted by the meeting.

The lecturer commenced by explaining that the spider does not belong to the insect group, as is very generally supposed. The life history of a spider was given. The eggs, ranging in number among different species, were deposited in a silken egg-sac specially prepared for their reception. The young are very tiny, but are almost complete spiders in miniature. They live in harmony in the silken sac for a little while and then moult, after which they are able to use their own spinning organs and to eat. They are great cannibals, and if enough food does not come their way they will eat one another. All young spiders, irrespective of species,

migrate, which they accomplish by means of a silken parachute, the threads of which constitute "gossamer." Poison facts and myths were discussed, the lecturer stating that any spider living in the British Isles could be handled with impunity; but some foreign species were doubtfully dangerous, but probably not so to a healthy man. The "Katipo" of Australia was stated to be the most deadly spider known, some specimens of which were exhibited, having just been received from a place many miles from any civilisation. The lecturer lucidly explained the method of snare construction and the various wiles which spiders adopt to capture their prey; also spider courtships. Trap-door, wolf, leaping, and water spiders were all discussed and interesting facts given respecting them and many other spiders, with concluding remarks on spider instinct and intelligence. The lecture was profusely illustrated with lantern slides, and terminated with a remarkable cinema film showing spiders performing various operations, including web-building and capturing prey.

At the conclusion of the lecture a short discussion followed, in which the President, Messrs. Hoskins and Holness, and the Hon. Secretary took part, the proceedings terminating with the election of four new ordinary members.

NOTES.

ZOOLOGY.

Gonia fasciata in Fermanagh.

Mr. J. N. Halbert of the National Museum, Dublin, informs me that the fly, *Gonia fasciata*, is unrecorded from Ireland. It is common here on a dry grassy bank facing south, but so far I have only seen it in this one spot, it seems excessively local. It appears every year in April, on sunny days, crawling among the dry grass stems and is very sluggish and only flies a short distance when disturbed. It disappears entirely, unless the sun is out. I have taken *Gonia capitata* on the Finner sandhills near Bundoran, Co. Donegal.

Charles Langham.

Tempo Manor, Co. Fermanagh.

Calocoris striatus at Woodenbridge, Co. Wicklow.

In my note on Powerscourt insects in the January number of the *Irish Naturalist* (p. 9, *supra*) it is stated that the plant-bug *Calocaris striatus* had been found at Tempo in Co. Fermanagh. Sir Charles Langham writes to say that this is an error, the insect was taken by him not at Tempo but at Woodenbridge in Co. Wicklow, on the same date as my capture of the species at Powerscourt. On the following days he found several more by beating oaks and other trees in different parts of Colonel Proby's woods in the same locality. From this it would seem that this species, though undoubtedly local, is not as rare as had been imagined in this country. Very possibly the Irish specimen in the

Haliday collection was also found in Wicklow, as we know that he collected a good deal in that county.

J. N. Halbert.

National Museum, Dublin.

British Oysters, Past and Present.

The above is the title of an exhaustive paper by Alfred Bell on the subject of the variation of the shell of oysters. It appeared in the *Essex Naturalist*, vol. xix, 1921, and deals with the species found in the British and Irish marine area. A few supplementary notes were afterwards published in the same journal. Mr. Bell's statement (p. 188) that the Irish Oyster fisheries have fallen off past recovery is surely too sweeping. He quotes Da Costa who wrote at the end of the 18th century about the past oyster supply of Ireland noting particularly a bed of rock oysters as large as horseshoes at Howth, Ireland's Eye and Malahide, which were said to have been "green-finned and of a delicate flavour." What age an oyster can attain has never been definitely established, but Mr. Bell is of opinion that the limit of age is certainly more than 30 years.

Everyone knows that the shell of the common oyster (*Ostrea edulis*) is very variable and that several well-marked varieties have been noted and recorded from Irish waters. Mr. Bell found the variety *parasitica* of Turton in the Irish estuarine clays. He also described two new varieties, viz., vars. *celtica* and *estuarii* both of which occur on the Irish coast. The latter variety is that alluded to by R. Ll. Praeger as being found in the estuarine clays of the North-East of Ireland.

Only two species of oysters were recognised hitherto in the Irish marine area (see A. R. Nichols —"List of the Marine Mollusca of Ireland"). Mr. Bell now describes eight new species of British oysters and several others which had not so far been reported from the British marine area. Some Irish examples are doubtfully referred to *Ostrea atlantica*, Bell. He is of opinion that the oyster figured by Miss Massy (*Fisheries of Ireland Scient. Invest.*, 1913) as a variety of *Ostrea edulis* is *Ostrea scaeva*, Monterosato. A Mediterranean oyster (*Ostrea cochleai*, Poli) was once dredged off the west coast of Ireland during the "Porcupine" Expedition. According to Mr. Bell it is common in the East Anglian Crag. Several others of his new species should occur in the Irish marine area.

Bird Protection in Ulster.

We are glad to note the formation in Belfast of an "Ulster Society for the Protection of Birds." The Secretary is Mr. P. F. Neill, 35 Candahar Street, Belfast, with Messrs. Nevin H. Foster and J. A. S. Stendall as scientific coadjutors. The Dublin society founded seventeen years ago for the same purpose has done such excellent work that we may look forward to equally useful activities in the North. Possibly, according to prevailing fashion, they will be able to take over northern functions hitherto carried out by the Dublin organization, such as the protection of the Red-throated Diver in Donegal.

Ravens at Lambay.

I think the Ravens which Mr. Pack Beresford (*Irish Nat.* Nov., 1921 p. 136) says that he saw on September 20th at Howth were probaby, the pair which make their home at Lambay. These birds were at first taken for Carrion-crows, and were so reported in the *Irish Naturalist* of February 1913. The identification was (very properly) called in question by ornithologists, and it may now be dismissed as erroneous. The Ravens have been observed as frequenting Lambay since 1912; in 1920 and 1921 they nested on the island and on each occasion reared two young ones, which were able to fly early in May, and are driven away from their home by their parents in September. On the 4th of June, 1921, one of this year's birds (a male) had the misfortune to be caught in a rabbit-trap. The two old birds can be seen or heard daily at Lambay. Through the winter they help themselves to the rats and rabbits that are caught in gins.

CECIL BARING.

Bishopsgate, London, E.C.

Notes on the Birds of Inishbofin.

I had an opportunity of spending three days on Inishbofin in the second week in June, 1920. As it is a somewhat out-of-the-way spot, the following notes may be of interest.

CHOUGH (*Pyrrhocorax pyrrhocorax*).—Fairly numerous. Several pairs are breeding. I was shown two nests, one in the old " Signal Tower " near the harbour, and the other in the cliffs on the north of the island.

WHEATEAR (*Oenanthe c. oenanthe*).—Exceedingly common all over the island, and breeding in large numbers in the crevices, under the rocks, etc.

CORNCRAKE (*Crex crex*).—Very numerous. These were to be heard calling from every part of the island, especially in the evening. I found one nest with eggs in the bank of a little stream in the centre of the island.

MANX SHEARWATER (*Puffinus p. puffinus*).—I was shown one nesting hole in the north, which contained one egg. (Recorded in " British Birds," vol. xiv., page 188). There were several other disused burrows, but I was unable to see any other birds.

Other species seen on the island were :—Hooded Crow (*Corvus c. cornix*), Starling (*Sturnus v. vulgaris*), House Sparrow (*Passer d. domesticus*), Yellow Bunting (*Emberiza citrinella*), Reed Bunting (*Emberiza s. schoeniclus*) Skylark (*Alauda a. arvensis*), Meadow Pipit (*Anthus pratensis*), Rock Pipit (*Anthus spinoletta petrosus*), Pied Wagtail (*Motacilla alba lugubris*), Greater Whitethroat (*Sylvia c. communis*), Blackbird (*Turdus m. merula*), Stonechat (*Saxicola torquata hibernans*), Wren (*Troglodytes t. troglodytes*), Cuckoo (*Cuculus c. canorus*), Kestrel (*Falco t. tinnunculus*), Gannet (*Sula bassana*), Cormorant (*Phalacrocorax carbo*), Shag (*Phalacrocorax graculus*), Ringed Plover (*Charadrius h. hiaticula*), Curlew (*Numenius arquata*), Oyster Catcher (*Haematopus o. ostralegus*), Artic Tern (*Sterna paradisaea*), Guillemot (*Uria t. troille*), Black Guillemot (*Uria grylle*), Herring Gull (*Larus argentatus*), Lesser Black-backed Gull) *Larus fuscus*), Greater Black-backed Gull (*Larus marinus*),

Having heard that an old man living in the "West Quarter" had a "strange bird" which no one could identify and which had never before been seen on the island by any of the inhabitants, I went to investigate, and found the mysterious creature to be a Little Grebe (*Podiceps minor*)! The unfortunate bird was hanging up in a little basket cage, and had apparently been kept thus for a considerable time. However, it was very difficult to persuade the owner to talk, and when he did I could scarcely understand a word he said, and so could not obtain any accurate information.

Owing to lack of time I was unable to make a thorough search of the island, thus, no doubt, overlooking many other species which I feel sure are inhabitants.

H. B. Cott.

Victoria Barracks, Athlone.

Hairy-armed Bat in Co. Down.

On 29th January a bat was captured about two miles from here and brought to me. It proved to be a specimen of the Hairy-armed or Leisler's Bat *Vespertilio leisleri* Kuhl. This species has twice previously been recorded from the neighbourhood of Hillsborough, September, 1903, *Irish Naturalist*, vol. xii., 320, and June, 1905, *ibid.*, xiv., 20. Probably this bat is not so rare as has been supposed, but its capture in lively condition on this occasion is interesting.

Nevin H. Foster.

Hillsborough, Co. Down.

GEOLOGY.

The Eskers of Ireland.

Mr. J. de W. Hinch's article in the *Irish Naturalist* for December, 1921 (vol. xxx., p. 137), is most interesting. The region between Mullingar and Tullamore and Tyrrellspass and Moate contains very many striking examples. As an ordinary layman I have studied these Eskers for 15 years. Their summits are 400 feet above sea-level in places. They extend mainly in lines between north-west and south-east, which disproves the tunnel theory, as rivers from the great melting glacier should run at right angles to these lines—the glacier probably hundreds of feet in thickness, coming down from Scandinavia. They contain all kinds of material between the finest sand, and pebbles and stones many tons in weight. I have never seen a shell-fragment. I have seen New Red Sandstone pebbles in the Barrow valley sandpits; this river has its origin in or near the region above-mentioned. The Brosna river cuts through a high Esker at one place. The central region being a flat plain, extensive lakes could not be hemmed in; they certainly could reach the flat shores of the Shannon if not the Boyne. Beyond doubt, the Eskers are the terminal moraines of the great melting glacier. In places they

run for miles in lines so even and straight as to suggest rule measurement ! And this condition is what one should expect on a level plain where the face of the glacier should have an even and uniform shape, and deposit its burden correspondingly.

James G. Butler.

Garryhill, Bagnalstown.

The note by Mr. Butler on the Eskers in the neighbourhood of Mullingar, Tullamore, and other localities in the central plain is a welcome indication of interest in this complicated question, and his statement that after having had these deposits under observation for 15 years, he has not found a shell fragment is most important. It is well known to those who have done work in this direction, that the local conditions for successful collecting of Glacial mollusca vary very quickly, and that a good collecting ground may be destroyed or overgrown in the space of a few years, and that therefore continuous observation of the sections available, is of primary importance.

With certain other conclusions of Mr. Butler I do not find myself in agreement. It is true that many books on the Ice Age contain maps which show north-western Europe covered with an ice-cap radiating from Scandinavia and extending from Cracow in the south-east to the Atlantic ocean in the west. This map is a generalized statement of fact, but while we may agree that Scandinavian ice reached south-east almost to the Carpathians, it has to be borne in mind that the British Isles and Ireland produced their own local ice-cap ; and that while the eastern coast of England was invaded by Scandinavian ice, no Scandinavian ice reached either Wales or Ireland.

Regarding the proposal by Mr. Butler to consider the Eskers as the Terminal Moraines of the melting ice-sheet, it may be pointed out that the terms " Esker " and " Moraine " are both well defined terms in geology, and that it will only lead to confusion to regard them as interchangeable, and that while a few Eskers have been mistakenly classed as Moraines and a few Moraines classed as Eskers, the number which have to be transferred in either case is not great, and does not effect the general broad division. It should also be remembered that any theory of the origin of Eskers does not effect the relation, in the field, of Eskers to Terminal Moraines, and that when high-pitched ridges of sand and gravel trend at right angles or nearly right angles to the Terminal Moraine they should be regarded as Eskers. If in any locality there are ridges called Eskers, but composed to any marked extent of angular rocky material, the view that they are Moraines rather than Eskers may be reasonably held, and the relation of these ridges to the undoubted Eskers should then be examined.

J. de W. Hinch.

Geological Survey, Dublin.

THE BIRD LIFE OF DUBLIN CITY.

BY ATHOLE HARRISON.

Observers of our local avifauna have a very prolific hunting-ground in Dublin, even in the city itself. It might be thought that but few species would be found in a city such as this is, but, far from being so, the number of species recorded from the city is, as far as I can ascertain, 80, a total which might seem incredible until one thinks of the numerous attractions Dublin offers to the birds with its many parks and squares and, more than all, its rivers.

In this paper is included the whole of the area within the city boundaries, with the exception of one or two areas which, while inside the boundary, are not strictly of the city ; such as Clontarf and Dollymount, and the extension of the Pigeon-house wall. These two areas alone could most probably bring the total from 80 to over 120, so that their exclusion is fully justified on that score alone. The area dealt with is bounded by a line running approximately from the North Lotts, along the N. C. Road, to Kingsbridge and Dolphin's Barn, and thence by the Grand Canal to Ringsend.

Of the commoner species, which one would expect to find, Dublin has most. Song Thrushes, Missel Thrushes, and Blackbirds abound in the gardens and parks, where their beautiful songs may be heard, especially on spring mornings, and to a lesser extent in the dusk. In the same localities we meet with the Robin, Hedge Sparrow, Chaffinch, and the less popular Magpie and Woodpigeon. About in the streets, and on the roof tops, are the House Sparrows, Starlings, Jackdaws and Rooks. Others, less common, are the tiny Goldcrest, Blue Tit, Coal Tit, Great Tit and Wren, while the spring brings us the Willow Wren, Chiffchaff, and Swallow, as well as the less-known Swift, which one sees and hears dashing and screaming about the housetops at dusk, after returning from the hills and fields where it has spent the day looking for food. In autumn, the dull-

coloured Sand-Martin often hawks for insects in the streets. Rutty, in his "Natural History of Dublin," says the shy and gaudy Jay used to occur about Dublin in his day, though it has long ceased to do so.

Some of our large parks and squares can add many interesting species to the list, and, of these parks, St. Stephen's Green is the most interesting. During summer the Whitethroat and Spotted Flycatcher may be seen among the trees, while on and around the lake are other interesting birds. Waterhens, Coots, and Little Grebes occasionally visit the lake in winter, and may be seen feeding there, not in the least discomposed by the numerous people walking around. It is probable that some Wild Ducks may visit the waters, especially at night, but it is difficult to discriminate between the tame and wild ducks on the water. At night the Snipe has been found there. Gulls are of course numerous, especially the Blackheaded species, and they have become very bold in robbing or forestalling the ducks of the titbits thrown them by the visitors. They are also very clever at catching crumbs of bread thrown into the air, which they rarely fail to seize before reaching the water. They do not appear to attack, or otherwise interfere with, the young ducklings which make such a pretty sight in the early summer. This is more than can be said of some of the Lesser Blackbacked Gulls which from time to time appear there. One of these, which visited the Green in the summer of 1907, caused such havoc among the broods of ducklings that finally it had to be executed by order of the Board of Works. The Common Gull has on occasion been seen there also, more often than it appears on the Liffey.

In Trinity College Park, I am informed that Redwings are quite frequently seen, while Fieldfares also occur, though only occasionally. During a match in the grounds, a spectator there saw a Woodcock among some undergrowth.

Birds of prey are more plentiful than one would think. Sparrow-hawks are constantly seen over the busiest streets, while along the quays they take their toll of the numerous small birds which are to be found there. The Kestrel,

or Wind-hover, is less common, but may be seen in a few places, such as the end of the North Wall, and that neighbourhood. The Barn Owl quite regularly patrols the streets at night. It is most often seen about Brunswick Street and Stephen's Green, while for some years the tower of St. Patrick's Cathedral was tenanted by one of these weird birds. The Long-eared Owl occurs on the canals just outside the city area, and probably comes inside the boundary at times.

Many of the smaller passerine birds are to be found along the Quays, particularly in winter when they obtain a fairly good living from the scattered grain, etc., which is plentiful enough. Among these are the ubiquitous Sparrows, also Greenfinches, Chaffinches, Linnets, Yellow-hammers, and Reed Buntings. Another of the Fringillidae I have seen there is the Lesser Redpoll, though only on one occasion. Pied Wagtails can be seen at most times of the year, except summer; and in autumn they roost in large numbers on the house-tops in some parts of the city. The Grey Wagtail is fairly common in winter, when it may be found also along the rivers and canals. House Martins used to nest in Ganly's, and though they do not do so now, they still nest in the city area in parts of the North Circular Road. On more than one occasion I have observed a Missel Thrush singing on the roof of the chapel on City Quay, opposite the Custom House.

The waste land at Ringsend and the North Lotts both contribute a goodly list, including the Meadow Pipit and the Skylark. The Snow Bunting used to occur at the Ringsend portion of the Pigeon-house wall; whilst the Corn Bunting is reported by Dr. C. W. Benson as having been heard singing at the North Lotts, where also, according to Watters, in his "Birds of Ireland," the Short-eared Owl occurs in winter, as he also says it does along the Pigeon-house wall. Rutty records the shooting of the rare Avocet in the winter of 1767 at the North Lotts. Mr. E. Williams in the *Irish Naturalist* says he has seen the Black Redstart in winter at the same place.

The small pieces of strand at Ringsend which are exposed at low tide attract several of the waders such as

the Oyster-catcher, Ringed Plover and Redshank. A few Rock Pipits also occur. This latter species was also seen in the city in another part, by Mr. C. B. Moffat, who tells me he saw one for some time in Hardwicke Street, running about a puddle.

The buoys at the mouth of the Liffey are often occupied by Cormorants and Shags, and occasionally by the Great Black-backed Gull, which sometimes comes into the mouth of the river in winter. The Cormorants are often seen flying over the city on their way to inland feeding grounds, as also is the Heron, especially near the Custom House. Hooded Crows and Lapwings are to be seen flying over also on occasion. The Red-breasted Merganser is a regular winter visitor to Dublin Bay from September to April and odd birds frequently occur in the region of the Alexandra Basin.

Mute Swans often come down the river, even as far as the end of the North Wall. Mr. Moffat tells me of having seen a flock of geese (probably White-fronted) flying over the river, while Watters reports a flock of Bernacle Geese which he saw flying quite low down over Ringsend in January, 1850. Mallards and Pochards come to the river in hard weather, and Watters saw Scaups in some numbers within gunshot of the North Wall, and he also tells of a Common Scoter being taken while searching for food in the bottom of a ditch at Beggar's Bush.

Nine species of gull are represented from the River Liffey. The Herring and Black-headed Gulls are commonest, and are seen all the year round, though only non-breeding and immature birds remain in the breeding season. Most of the breeding birds have left by April. Many people erroneously think that the Black-headed Gull in its winter plumage is a distinct species from this gull in its breeding plumage, when it has assumed the hood, which the adult birds do in February, though the immature birds are a month later in assuming it. The next commonest is the Lesser Black-backed Gull, which is most numerous in spring and summer, when it occurs on the canals also. It is almost, if not entirely absent in December, January, and most of February. A favourite haunt of this bird is

the sewer-outfall at Wellington Quay, a great place for gulls of all kinds. The Great Black-backed Gull I have already referred to. The Kittiwake ventures as far up as the L.N.W.R. boats, but is seldom seen any higher. The same applies to the Common Gull, with the difference that the latter species also occurs on the canals and in Stephen's Green on occasion. Though it does not regularly come far up the river, it frequently visits the Wellington Quay part referred to above.

Of the rarer gulls, Watters reports a Glaucous Gull shot near the North Wall in the winter of 1849. Mr. R. J. Ussher, in his "Birds of Ireland," records that a Little Gull was observed feeding on the Liffey with other gulls at Ringsend on December 6th, 1876. In more recent times Mr. W. J. Williams, in a letter to the *Irish Naturalist*, reports the occurrence of an Iceland Gull near Grattan Bridge in May, 1906. The only other bird of the river I have to mention is the Razorbill, which is often in the mouth of the river and has been seen as far up as the Custom House.

Of "ships that pass in the night" we have not a few. The lights of the city attract migrants on cloudy and misty nights, and their clamorous calls resound all through the early spring, and again in the autumn. In spring we hear the so-called "weird and mournful" cry of the Curlews, and the entirely different call of the Whimbrel or "Seven Whistler." We also hear these birds in autumn as well as the Fieldfare, Redwing, Skylark, Golden Plover, and some few others whose names I have already mentioned in other parts of this paper.

The Siskin and one or two others have frequently been seen and are, in some cases, common, just over the boundary, and it is probable that they occur at times inside the city area.

Dublin.

SOME FORMS OF PIERIS NAPI TAKEN IN COUNTY FERMANAGH.

BY SIR CHARLES LANGHAM, BART.

In the following list I have endeavoured to describe the various forms of *Pieris napi* which I have taken in this district during the past few years. The spring, summer and autumn of 1921 were very favourable to this butterfly. I never saw so many in any other year ; they were literally swarming in places, especially on wet low-lying ground. The butterfly first appeared on April 20th and they continued with only a short break up till October 15th on which day I saw a newly emerged male. As this butterfly is usually nearly over by the end of August, one cannot help thinking that the swarms one saw in September and the beginning of October formed a partial third brood of the year ; the fine hot weather inducing insects to emerge that should have remained in the pupal state until April following. This was the only butterfly that was numerous here last summer, other common species being decidedly scarce : except *Vanessa atalanta*, which although usually very rare here appeared in some numbers in the autumn.

I have so far never come across the var. *flava* of *Pieris napi*, though I have been on the look-out for it for years, any yellow specimens I have obtained being nothing like such a bright yellow as Mr. Kane's insect, which is now in the Natural History collection of the National Museum in Dublin. There is in both sexes a good deal of variation in the size and shape of the wings, especially in the hind wings, also in a great many specimens there is a very distinct darker spot in the apical blotch ; this spot is not mentioned in the description of *P. napi* in any book I have, and in my English specimens it does not show up so clearly as in the Irish insects ; in the list of forms given below I have not taken this spot into account except in No. 4 of the females ; in this specimen the spot is so very distinct that I had to mention it. Taking the forms of the male butterfly first :—

1. The apical blotch small and no spots on the fore or hind wings ; this is not very common here and appears usually in the first emergence.
2. Apical blotch larger and with one small spot on each fore and hind wing ; this is the commonest form of the male and is usual in both spring and summer emergences.
3. Apical blotch large and black and a large black spot on all the wings and another spot near the inner margin of the fore wings ; appears chiefly in the summer emergence and is usually common.
4. Apical blotch large and spots all very black and the ends of the nervules much blackened and forming radiated stripes at all the outer margins ; decidedly scarce.
5. Upperside of all wings decidedly pale yellow ; not uncommon.
6. Underside of hind wings pale yellow ; very common.
7. Underside of hind wings bright primrose ; very common.

In the female forms there is a much greater range.

1. Apical blotch small and pale, with the two spots and dorsal marginal bar on fore wings and the two spots on the hind wings, small and not very black, the nervules not heavily shaded ; generally common.
2. All the markings and spots large and very black, and the nervules heavily shaded ; common in both emergences.
3. All the markings and spots very grey and the nervules broadly shaded and the base of the fore wings especially very grey—giving a rather washed out appearance ; most common in the spring emergence.
4. Apical blotch dark, and with a distinct spot within its area forming with the other two spots and the dorsal marginal bar a continuous dark band or bar. This I have only taken on three occasions all in the summer emergence.

5. With the costal margin bright yellow; this form is fairly common in the spring emergence and decidedly so in the summer brood. I have bred this form from larvae fed on water-cress.
6. All spots small and pale and with the costal margin and fringes on all wings bright yellow, a very pretty form. I have only one specimen, which was bred from a larva fed on water-cress.
7. Ground colour of all wings creamy and all markings small and very pale grey; scarce but taken in both emergences.
7A. Ground colour yellowish and markings grey, except the two spots on upper wings, which are very black.
8. Ground colour creamy yellow and all markings and nervules very dark; scarce and appears most often in the summer emergence.
9. Ground dirty yellow or buff colour, apical blotch and spots grey and the nervules and base of forewings heavily shaded with smoky grey; this is the nearest approach to the alpine variety *bryoniae* that I have come across; and I have only taken one specimen, which I captured in the month of May.
10. All the usual markings very large and black and the extremities of all nervules with broad black streaks especially on the fore wings; fairly common in the second emergence.
11. With two spots on the upperside of each hind wing common in both emergences.
12. With three distinct spots on the upperside of each hind wing one on the costal margin, one in the middle area and a third near the anal angle; scarce and generally in the summer emergence.
13. Centre area of all wings on the upper side creamy yellow, the rest of the wings white; one only taken, in the summer brood of 1921.
14. The underside of hind wings pale yellow and the nervules much shaded with green; very common.

15. The underside as in No. 14, but with the nervules only very slightly shaded with green; very common.
16. The underside of hind wings bright yellow and nervules heavily shaded with green; very common.
17. The underside of hind wings decidedly pale orange colour and nervules heavily shaded with green. I have only one taken in August, 1921.

Tempo, Co. Fermanagh.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 21.—J. A. S. STENDALL presided. J. C. A. BRIERLY, M.Sc., gave an interesting paper of "Radio-Activity in relation to Geology." Starting with the discovery of helium in the sun's atmosphere by Sir Norman Lockyer he gave the history of the observation of the photographic and electric effects of certain minerals; the separation of helium by Hillebrand, and its subsequent identification as helium by Lockyer and Ramsay. The discovery and identification of argon by Rayleigh and Ramsay, and the separation of the crude argon into argon, krypton, xenon, and neon were described, and the identification of radium "emanation" as niton was demonstrated; these six new elements filling their respective vacant spaces shown in the periodic law of Newlands and Mendeleeff, thus proving that no further member of this group remains unknown. He then dealt with Mons. and Madame Curie's work on pitchbende and other uranium minerals and the discovery of radium, afterwards describing the earlier work of Becquerel and Crookes on the "Becquerel rays," demonstrating their analysis into α and β and γ rays, and following up with the discovery of polonium and ionium, and the identification of the latter as an "isotopic" form of lead. The work of Rutherford and Soddy on thorium and the separation of radio-active thorium X were described, and then the electric charge, mass and velocity of the α particles, and the fact that the α particles were positively charged helium atoms demonstrated. The filtration and counting of the α particles and the filtration, imponderability, and velocity of the β rays were demonstrated, and the rate of growth and of decay of radio-activity described and explained. The effect of current and magnetic electricity upon the α and β rays and the deductions drawn therefrom lead to a discussion of the modern conception of the constitution of the atom, and finally in considering the varying radio-activity and the products thereof found in different geological strata

minimum estimates of the ages of the various strata of the crust of the earth were given, these min ma being stated as from 850 million years to about twice that number.

A vote of thanks, warmly passed by acclamation, closed the proceedings.

DUBLIN NATURALISTS' FIELD CLUB.

December 8.—The Vice-President in the Chair. Dr. G. B. Crawford delivered, a lecture illustrated by a large number of lantern-slides, describing "A Voyage on a Dundee Whaler to Greenland and Labrador." Vivid descriptions were given of the habits of the seals and whales observed during the voyage, and Dr. Crawford's own slides in illustration of the scenery were particularly telling. A number of questions were then asked, to which the lecturer replied.

January 12, 1922.—The Annual General Meeting was held in the Royal Irish Academy House, C. B. Moffat (and subsequently the new President) in the chair. The annual report read by the Hon. Secretary (Mrs. Long) showed that an interesting series of excursions and meetings had been held during the year, and the membership stood at 76. The financial statement (audited by Dr. Crawford) showed a small balance in hands. On the motion of Mr. Praeger, seconded by Mr. Hinch, the report and statement were adopted. The result of the election of Officers and Committee was then read out, Professor Trench being declared President and J. de W. Hinch Vice-President, Mrs. Long Hon. Secretary and C. B. Moffat Hon. Treasurer, while three vacancies on the Committee were filled by the election of W. F. Rogers Brambell, Athole Harrison, and Philip B. Roberts. The President (Prof. W. F. Trench) on taking the chair addressed the Club on the subject of "Poets' Nature Study," indicating the modern character of the growth towards an appreciative study of Nature as found in the poets, and inviting consideration of the question how far the philosophy of the Wordsworthian school in regard to Nature's teachings was in harmony with the conclusions of science. A vote of thanks to the President for an address that had deeply interested all who heard it was unanimously passed on the motion of R. L. Praeger, seconded by C. B. Moffat. A number of photographs illustrating bird-life in Ireland and the Isle of Man were exhibited by A. Harrison, and the meeting adjourned.

February 9.—The President in the Chair. At the beginning of the meeting reference was made by the President to the death of a well-known member of the Club (Rev. J. Hamilton) and a message of sympathy was ordered to be conveyed to the Hon. Secretary (Mrs. Long) on her bereavement. A new member, Mr. Seymour C. Harrison, was elected. An interesting paper was then read by Miss Sheila Saunderson on the "Autumn Colours of Trees," explaining the causes to which some of the difference of tints were due, and making special reference to the paucity of published material on the subject. Professor Henry, Miss West, Mr. Hinch, the President, and others took part in the discussion, which

ranged into a rather wide variety of topics, including the question whether differences in the autumnal tints of otherwise similar trees could be relied on as racial characteristics.

March 9.—The winter session concluded with a meeting devoted to exhibits with a few short papers, the Vice-President (J. de W. Hinch) in the Chair. Among the objects exhibited were a South American bird (*Cacicus persicus*) with its pendent nest, contributed by Miss Denning; two nests of the Long-tailed Titmouse, shown by J. N. Halbert; and some clutches of eggs of the Irish Jay, Corn Bunting, and Bullfinch, shown by G. R. Humphreys. The last-mentioned was remarkable as consisting of six eggs, a number that Mr. Ussher states ("Birds of Ireland," p. 69) that he has not known to be laid by the Bullfinch in Ireland. Mr. Humphreys mentioned that many species of birds laid larger clutches in Co. Wicklow than elsewhere in this country. R. Ll. Praeger exhibited sprays of a large number of species of the genus Olearia (Daisy Tree) and explained their curious equipment for the conservation of moisture. Mr. Hinch showed an interesting series of Irish copper and other ores. Of the papers read, that on the "Bird-Life of Dublin City," by A. Harrison, which gave rise to some interesting discussion, is given to our readers in extenso. A short paper on some habits of the Red Admiral and Painted Lady butterflies was contributed by C. B. Moffat, who described a series of conflicts he had witnessed among insects of these two species on the summit of a Co. Wexford hill on many days during June, 1920. Some other items in the programme were held over owing to the lateness of the hour.

NEWS GLEANINGS.

THE NATIONAL MUSEUM.

Dr. R. F. Scharff has lately resigned the Keepership of the Natural History division of the National Museum, after thirty-eight years' service. The development of the collections—both in the exhibited series and in the study cabinets—has been his constant care, and the Museum in its present condition is a monument to his zeal and energy. It is hard to over-estimate how much the study of natural history throughout Ireland owes to his work and influence.

We are glad to state that the vacant post has been filled by the promotion of Mr. A. R. Nichols, whose long and valuable service for the Museum is thus suitably acknowledged.

NOTES.

BOTANY.

Lichens on Veronica Traversii.

Two large shrubs of *Veronica Traversii* in the garden of Lehenagh House, Cork, were found in 1918 to be so infested with lichens that the larger branches were weighed down dangerously and the shrubs were in a thoroughly unhealthy state. Both measured about 12 feet in diameter. One, which was the more shaded, was almost completely broken down. Its outer branches, having been propped up with sticks and tied together with string, made a canopy inside which new shoots were struggling to form a healthy shrub. The other had retained its conical form but the leaves were limited to the extreme tips of the branches, the inside of the hut thus formed being grey with an extraordinarily luxuriant growth of lichens. The neighbouring rhododendrons, laurels and barberries showed little trace of lichen growth. An examination was therefore made to find out the reason for this selection and the best way to save the shrubs. The reason was found to lie in the peculiar character of the bark of this species of Veronica. A young healthy twig has an indentation in the bark at the base of each pair of the decussate leaves. In slightly older twigs this becomes a distinct furrow, encircling the twig by the time the leaf falls. In the furrow water, algae, fungal spores and other debris collect and form an ideal nest for lichens. In an unhealthy state the leaves would fall off early, leaving the bark softer, and therefore more easily penetrable by lichen rhizoids. A well-established lichen may cast off its spores or soredia to be washed or blown into a suitable crevice. There, if conditions are favourable, a new lichen slowly develops. But also, if a lobe of the old lichen chances to touch a suitable spot on the bark, it may, like a gooseberry sucker, give rise to a new plant. The distance between the furrows of this Veronica are well fitted for this mode of reproduction, so that the upper surface of an old branch is easily covered by a matted tangle of shrubby lichens. Inside the twig the bark is broken by the wedge-like action of the rhizoids. In this furrows this disintegration is the more serious because the living tissues of the bast are nearer the surface and are touched though not directly attacked by the fungal threads. The bark is thus loosened into a series of rings, a process which normally takes place so gradually that the stem has time to develop a new bark in place of the old.

The rotten branches of one shrub were cut away, and the new growth is as yet free from lichens. The other has been pruned so as to allow more light and air to enter. It is now in a healthier state. The following species of lichens were identified :—*Ramalina farinacea, R. fastigiata, Evernia prunastri ; Usna hirta ; Parmelia sulcata, perlata, physodes, caperata, exasperata ; Lecanora sulpisca ; Graphis scupta ; Graphina anguina.*

Cork. LILIAN PORTER.

HENRY LYSTER JAMESON.

THE death of Dr. H. L. Jameson, at the comparatively early age of forty-seven will be received with feelings of deep regret among his many friends in Ireland. He died suddenly at West Mersea, in Essex from haemorrhage of the lungs after having been for some years a great sufferer from asthma.

Only son of the Rev. Paul Lyster Jameson, rector of Killencoole, in the County Louth, Henry Lyster Jameson developed an early taste for natural history. As a young man of seventeen he contributed some notes on birds to the pages of the first volume of the *Irish Naturalist*. Later on he turned his attention more and more to insects. At home he kept an aquarium, in which he observed various forms of freshwater beetles and other creatures. He was a keen observer, and full of enthusiasm for any new zoological discovery. When a lighthouse-keeper at Carlingford shot what turned out to be a Yellow-billed Sheath-bill—a South American bird, it was young Jameson who sent the first full description of it to this magazine in June, 1893. He now became a student in Trinity College, Dublin, and we saw a great deal of him in the Museum. A subject which then fascinated him particularly was the study of the habits and distribution of bats, which resulted in his first article on "Irish Bats" in this magazine (April, 1894). In the following year he contributed a series of papers on Irish bats, containing a list and distribution of all the species. When the well-known French cave-explorer, E. A. Martel, wrote to me that he wished to visit some of the more notable Irish caves, and was anxious to secure a suitable companion, I recommended Jameson. And so Martel's short but memorable visit to Ireland was carried out in the company of one whom he called "ce charmant jeune entomologiste." Martel's visit gave the first impetus to cave researches, and his extremely interesting article, with a map of Mitchelstown cave, in this magazine will be remembered, together with Jameson's notes on the animals he met with in this cave and the

Enniskillen ones. A really delightful memento of this tour is Martel's little book entitled "Irlande et cavernes anglaises," published in Paris in 1897. In spite of its title it deals largely with Irish caves.

After having finished his studies in Dublin, Jameson spent a year at the Royal College of Science in London with Prof. Howes, and then proceeded to Heidelberg. As a pupil of Prof. Bütschli he had the advantage of being taught by one of the foremost microscopists in Europe. After taking the degree of Ph.D. in Heidelberg, he returned to Ireland, and shortly afterwards accompanied Prof. Herdman, of Liverpool, to Ceylon in order to study the pearl-oyster fisheries. Dr. Jameson's papers on the structure and origin of pearls were favourably received, and he showed in them considerable originality, having established the parasitic theory of pearl formation. Unfortunately failing health prevented his remaining in England. Owing to threatened consumption he was obliged to winter abroad. He selected South Africa, and obtained employment under the educational authorities of the Transvaal. Having somewhat regained his strength he returned to England a few years before the war broke out and entered the Board of Education. All this time he longed to be back at some occupation that was more congenial to his tastes, and when he was offered an inspectorship for the south-east coast by the Ministry of Agriculture and Fisheries, he accepted it with delight. But the winter climate played havoc with his health, and he found himself less and less able for any kind of physical exertion. His last appointment was that of adviser on Inshore Fisheries to the Development Commission, where his advice and knowledge were greatly appreciated. He was of a gentle and lovable disposition, combined with resoluteness of character and determination which enabled him to overcome the many difficulties and trials in life which he was destined to face. He leaves a widow and two daughters.

R. F. S.

IS THE SQUIRREL A NATIVE IRISH SPECIES?

BY R. F. SCHARFF, B.SC., PH.D.

THIS question was very fully discussed by the late R. M. Barrington,[1] and since he came to the conclusion that the Squirrel was not indigenous to this country, a re-examination of this animal's claims to be included among Irish natives seemed unnecessary. But the discovery of further historical data concerning the presence of the Squirrel in Ireland many centuries ago throw doubts on the correctness of Mr. Barrington's assumptions. In justice to the views of this distinguished Irish naturalist it should be mentioned that when he wrote the paper referred to he did not regard the question as finally settled and the matter has never been discussed in the pages of this magazine.

Mr. Barrington traced the origin of the Squirrel in Ireland to ten centres of introduction. His remarks were illustrated by a map on which these centres are indicated and from which he claimed that the species had spread to other parts of the country. We must take it for granted that between the years 1815 and 1875 Squirrels were actually introduced into Ireland from England and liberated in those centres. Mr. Barrington adds that if the Squirrel had already existed in Ireland at the time, there would have been no need or object in introducing it. That sounds common sense, and yet it is just the people that thoughtlessly introduce animals where they think they do not exist, who frequently are ignorant of the fauna of the country they live in.

Now as regards the County Wicklow, Mr. Barrington referred to the story which he had from Mr. Synge of Ashford that the latter's grandfather had brought a pair of Squirrels to the country between the years 1815 and 1825, and that this was the first introduction of the animal into Ireland. Mr. Barrington then related what a surprise the

[1] Barrington, R. M.—"On the introduction of the Squirrel into Ireland." *Sci. Proc. R. Dublin Society.* vol. ii., 1880, pp. 614-31.

Squirrel caused when it first showed itself at Fassaroe, near Bray, in 1861, and when it was mistaken for a Weasel.

Although it is now common all about the Enniskerry and Bray districts, many people still persist in calling it a "Weasel." Only a short while ago I was told by a local Wicklow farmer that he had noticed a Weasel running across the road. When I said to him "Are you sure you know a Weasel when you see one?" he replied, "Don't I know the bushy tail of him." Mr. Barrington was aware that Rutty[2] stated in 1772 that the Squirrel was said to occur in Luttrelstown in the County Dublin, and that O'Flaherty[3] in 1684 mentioned it as inhabiting West Connaught, but he regarded these statements as erroneous.

In the last issue of Barrett-Hamilton and Hinton's excellent monograph on the British mammals,[4] the Squirrel is very fully dealt with. The authors look upon the British Squirrel as distinct from the continental form and apply to it the term "Light-tailed Squirrel" (*Sciurus leucurus*). The Irish Squirrel is not believed to be distinct from the British, but this matter to my knowledge has not yet been thoroughly investigated. It is possible that there may be two distinct races or varieties of Squirrels in Ireland, one being the descendants of the introductions referred to and the other a survival of the ancient Irish Squirrel. For it must be mentioned at once that there can no longer be any reasonable doubt about the Squirrel having been a native of Ireland long before the modern introductions took place.

The authors of the work mentioned give ample historical references to the former occurrence of the Squirrel in this country and most of these were apparently supplied by the well-known Irish archaeologist, Mr. T. J. Westropp. In the thirteenth century a tax on Squirrel skins was levied, and there are records of such taxes from the whole island except the north and north-west. The fur of the Squirrel

[2] Rutty, John: "Natural History of the County Dublin." 2 vols., 1772.

[3] O'Flaherty: H'Iar Connaught. 1684.

[4] Barrett-Hamilton and Hinton: "A History of British Mammals." London, 1910 and onward.

was used for trimming the robes of Irish officials. The actual prices paid for the skins are known and clearly distinguished from those of the Marten and "Weasel." We now know that the Irish Stoat was always known as the "Weasel" which is really not found in Ireland. In the "Libel of English Policie," written about 1430, a list of Irish fur-bearing animals is given among which figure the Otter, Squirrel, Hare, Sheep, Lamb, Fox, Goat, and Rabbit. Skins of Squirrels were largely exported at the time from Ireland, and it must be assumed that this animal was quite abundant in the country.

The mere fact that there are several Irish-Gaelic names for Squirrel implies that the latter was probably a native species. The word at present is use is "iora ruadh," but other terms which have been applied to it, some being apparently obsolete, are "feoróg," "ora," "iora," "ir" and "easóg" The latter is clearly the Irish Stoat (or so-called "Weasel"), as I pointed out in my notes[5] on the Irish names of mammals.

Whether the word "crichâran," which appeared in the list of wild Irish animals produced before the King at Tara long ages ago, is another word for "Squirrel," as suggested in Barrett-Hamilton and Hinton's monograph, I am not qualified to determine. It was mooted by a linguistic contributor that this word might be a mis-reading of "craobharan," which would have meant "tree-animal."

At the present time Squirrels are known from the following counties :—Wicklow, Dublin, Kildare, Wexford, Waterford, Tipperary, Kerry, Carlow, Kilkenny Queen's, King's, Galway, Roscommon, Longford, Westmeath, Donegal, Antrim, Tyrone, Fermanagh, Monaghan, Londonderry, Down, Armagh, Louth and Meath. There is no evidence as yet of their occurrence in Leitrim, Cavan, Sligo, Mayo, Clare, Limerick and Cork.

There can be no doubt that once the extensive forests of Ireland were being cut down Squirrels must rapidly have diminished in number. I have mentioned that

[5] Scharff, R. F.—"On the Irish Names of Mammals." *Irish Naturalist*, vol. xxiv. 1915.

according to O'Flaherty the Squirrel still lived in Connaught in 1684 while K'eogh alludes to it in his list of birds, beasts, fishes, reptiles and insects commonly known and propagated in this kingdom in 1739. Is it possible that the Squirrel survived the next hundred years until an impetus was given to the replantation of demesnes and tracts of forests ? The possibility and even probability of such a survival cannot be denied for in the 18th century there still existed large woods scattered about the country in which a few Squirrels may have survived. The extinction of the ancient Irish Squirrel may therefore not have been complete. The question could possibly be settled by carefully comparing skins from all parts of Ireland with a series of English ones. And this could best be accomplished in the National Museum. If any survival of the old Irish Squirrel has taken place some of the Irish skins and skulls may exhibit distinctive features from the British ones. As yet no material is available for such a study, and it is to be hoped that all those interested in a knowledge of our fauna will send any skins they may be able to obtain to the Museum in Dublin for further critical examination.

Knockranny, Bray.

NOTES.

Humming-bird Hawk-Moth in December.

On December 10th my servant called me to see a "big fly" that was buzzing in the staircase window. When I went the "fly" was a Humming-bird Hawk-moth (*Macroglossa stellatarum*). It must have been hibernating and had been enticed from its hiding-place by the mildness of the day. That same evening thrushes were singing and the Dor Beetle (Geotrupes) was flying about, a sure indication of a warm evening.

W. F. Johnson.

Killincoole Rectory,
Castlebellingham.

Two small Parasitic Hymenoptera from Co Wexford.

In the summer of 1920 I received from Miss Deane, of Longraigue, Foulks Mills, Co. Wexford, a small cocoon, of cotton-like material, which she had found attached to stems of the Rough Cocksfoot Grass (*Dactylis glomerata*), and of which she wished to learn the origin. I accordingly took it to the Museum and consulted Messrs. Halbert and Stelfox, who at once took charge of the cocoon with a view to the identification of the inmates (some of the smaller Hymenoptera, as they at once perceived) as soon as they emerged. The insects that emerged proved to be of two species, *Apanteles callidus* and *Panargyrops tenerrimus*, the former, I believe, a known parasite on the larvae of lepidoptera, and the latter a "hyper-parasite," victimising members of its own class. On January 21st, 1921, Mr. Stelfox wrote to me the interesting information that as many as 133 insects had emerged from Miss Deane's small cocoon. Of these 46 were assignable to *Apanteles callidus*, and 87 to the hyper-parasite *Panargyrops tenerrimus*. A curious fact about the latter was that 71 of the entire progeny were females and only 16 males. I hope that even these isolated facts with regard to an order so little studied and so remarkable in its instincts may be thought deserving of publication.

C. B. Moffat.

Dublin.

The Song of Birds.

Perhaps some readers (from different parts of the country) who are interested in that branch of animal behaviour represented by birds' song, would be good enough to take the following simple notes this June or July about Chaffinches, Blackbirds and Thrushes, or any one of them, and send them to me. The object being to explore any relation between England and Ireland or between latitudes in the same, in respect to the termination of the spring song period. (This appears to be also an indication of the relative number of broods).

1. Week when there appears to be very little song left.
2. Date of last song noticed.

With me, for example, (1) will likely be Chaffinch—second or third week in June ; Blackbird—first week in June ; Song Thrush—second or third week in June.

J. P. Burkitt.

Enniskillen.

An Early Swallow.

Mr. Joseph Skillen informs me that he saw a Swallow flying about at Kilroot, Co. Antrim, on 7th March of this year. So far as I know, the previous earliest Irish record is 17th March (*Irish Nat.*, vol. xii., p. 198).

Nevin H. Foster.

Hillsborough, Co. Down.

Black Redstart on Hill of Howth.

Early on the morning of April 1st (weather very severe at the time) I had the pleasure of watching a Black Redstart for about a quarter of an hour. It was steadily searching for hibernating insects in the crannies of a row of wicker hurdles near the house. It was not in black plumage, so must have been either a female or young male. I am very familiar with the appearance of this little bird in Switzerland. In his "Manual of British Birds," Howards Saunders states of this species—"To Ireland it is an unfrequent winter visitor chiefly on the east and south coasts."

A. L. Massy.

Baily, Co. Dublin.

Corncrake in December.

My friend, Mr. W. A. Hamilton, of Coxton, Co. Donegal, writes, that on December 30th his dog caught a Corncrake as it rose in flight. He examined the bird, which was in good condition, but could not detect any trace of injury, but he suggests that it may have been slightly injured by a mowing machine, and consequently been unable to join the autumn migration of the other Corncrakes.

W. F. Johnson.

Killincoole Rectory,
Castlebellingham.

Fulmar breeding on Rathlin Island.

I believe I am right in stating that Horn Head in Co. Donegal, is the only place in the north of Ireland from which the Fulmar has been recorded as breeding.

Information has now reached me that seven of these birds were seen on Rathlin Island, Co. Antrim, last season, one pair hatching out their young. Two pair have already been seen there this season.

I have the exact nesting locality, but for obvious reasons refrain from giving it.

J. A. Sidney Stendall.

Museum, Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 28.—ANNUAL MEETING in the Royal Dublin Society's Theatre, the President (SIR FREDERICK MOORE) in the Chair. Prof. ELLIOTT SMITH, F.R.S., gave an illustrated lecture entitled "Our Rude Ancestors," describing and comparing modern and ancient human skulls and brains with those of other primates, with especial reference to the newly discovered abnormal human skull from Broken Hill, Rhodesia. A hearty vote of thanks was accorded to the lecturer.

The Hon. Secretary (Prof. A. FRANCIS DIXON) presented the Report for the year 1921 in which the Council desires to place on record its grateful appreciation of the whole-hearted support which the Society has received during the year from so many of its members and friends. During the earlier part of the year, owing to the disturbed state of the city and country, the Society's finances suffered severely, and the outlook became rapidly more and more gloomy. At the beginning of July the gate receipts for the half-year were more than £200 below the total sum from this source at the corresponding time in 1920. But, on the establishment of more happy conditions in the middle of July, the public began to visit the Gardens in much greater numbers, with the result that the total gate receipts for the year 1921 exceeded by a few pounds those of 1920. The visitors in 1921 came almost exclusively from city and county of Dublin, as there were practically no excursions from more distant parts of the country. Thanks to special efforts made by members of the Society and by the Council, the receipts from the subscriptions of new members in 1921 exceed those of 1920 by almost £400. This gratifying result will, it is hoped, lead to a further increase in membership in the near future, as the Council believes that each new member will endeavour to interest his friends in the welfare of the Gardens.

Every effort has been made to adjust expenditure to income; but the continued high prices of food-stuffs and of all services, including transport, has made this extremely difficult. The year, unfortunately, ends with a bank overdraft of £803 2s. 4d. on current account, as compared with £621 3s. 7d. at the end of 1920. This includes an expenditure of £170 on new animals during the month of November. The Council felt that it was wise to invest this sum in acquiring specimens of the interesting Australian animals brought to England by Mr. Le Souef. Such an opportunity rarely presents itself.

The total gate receipts for 1921 amounted to £3,025 0s. 4d., as against £3,009 17s. in 1920. This represents 132,624 visitors. Members' entrance fees and subscriptions amounted to £1,088 10s., as against £743 13s. in 1920, and £878 13s. in 1919. The year's total of gate receipts in 1921 is the third largest in the history of the Society.

The Right Hon. the Earl of Dunraven has accepted the nomination of the Council to the position of Honorary Member. Professor J. E.

Duerden, Middleburgh, South Africa; Mr. T. A. Finch, West African Service; and Mr. R. H. Ellis, I.C.S., East Hill, Calicut, India, have been elected Corresponding Members of the Society. 149 Annual Members, 35 Life Members, and 18 Garden Subscribers were elected in 1921. The total is the largest in the history of the Society.

In accordance with the "Laws and Regulations of the Society," Sir Frederick Moore, who has been President since January, 1917, resigns office to-day. It is a source of deep regret to the Council that his term of presidency has expired. The years during which Sir Frederick Moore has directed affairs have been the most trying and difficult in our history; and the Society has every reason to be thankful that in the time of need it had the guidance of a man possessed of so much tact, resource, and ability. His interest in the Gardens and his devotion to their welfare are unbounded; and only those who, like the members of Council, have had the privilege of working with him day by day are in a position to appreciate fully the magnitude of what he has accomplished. In all his work for the Society Sir Frederick Moore has had the generous help of Lady Moore, to whom also the Society owes a deep debt of gratitude.

For the vacant presidency the Council has pleasure in proposing the name of Sir Robert H. Woods, who has been for many years an active member of Council. The Council feels that in him the Society will have a worthy President, and that the guidance of its affairs will be in safe hands.

As for many years past, *post-mortem* reports have been received by the Council on the animals which have died in the Gardens. These reports are of much interest and most useful in guiding the action of the Council in its efforts to secure proper food and suitable conditions for the animals in its charge. The thanks of the Society are due to Principal James Craig for the care and trouble he has taken in preparing these reports. Thanks are also due to Professor J. Alfred Scott, who has kindly taken the place of the Hon. Secretary in his occasional unavoidable absence from the Council meetings.

During the year the Dublin newspapers have most kindly helped the Society by printing reports of meetings and many interesting notices of new animals at the Gardens.

By far the most important improvement made in 1921 was the reconstruction of the Bear Dens. This work was rendered possible by the success of the Fete held in July, 1920. The new enclosure has been erected on the site of the old one, and the plans for it were kindly drawn up by Mr. Arthur Bretland, who has taken every care to provide for the comfort of the bears. The structural work was done by Messrs. Kennan and Sons, and the whole has been carried out in a most satisfactory manner. The total cost reached £972 13s., and this large and necessary expenditure prevented the Council undertaking much other work. The cages on the west side of the Haughton House have been roofed with glass, and by this means have been rendered dry and comfortable.

The annual census made on December 31st, 1921, shows that at that date there were 131 Mammals, 322 Birds, 11 Reptiles, and 48 Fish in the collection.

The most serious loss by death which occurred in the year was that of the Chimpanzee "Fanny." She had been in the Gardens since September, 1919, and was a most clever and attractive creature—always gay and mischievous. She was ill for a short time only, and is believed to have died from septic poisoning. The death of the second of the two Pandas which had been in the Gardens for some years is also to be regretted.

During the year two male Chimpanzees were purchased, both of which are doing well. They are very friendly and playful. A pair of beautiful Lion Marmosets were obtained, and have been allotted a large glazed cage in the Monkey House. Here they are seen to great advantage, as they have plenty of room to display their wonderful activity. A Bison calf was born at the end of October. It is the fourth Canadian Bison born in the Gardens. Like the others, the calf at birth was of a very light-yellowish brown colour; week by week its coat has become darker, and it is now nearly as rich and deep brown as its parents. The two young Bisons which were in the Gardens in 1920 were sent to Edinburgh in exchange for other animals. A Zebu calf was also born in the Gardens in April last.

During the year two Leopards were obtained for the Carnivora House; one of these unfortunately lived but a short time; but the other, a gift of R. H. Ellis, Esq., I.C.S., is in good health. This handsome animal has been a great pet, and has taken very kindly to its new surroundings in Dublin. Additions to the carnivora also include a well-grown Puma; a spotted Hyæna, the gift of E. B. Bate, Esq., M.B., who has on many former occasions presented interesting animals to the Society; and a fine pair of young Brown Bears, presented by the Zoological Society of Scotland. A young Lioness, born in 1920, was sent to the Gardens at Toronto, and arrived there in good condition after its long journey. An interesting Peba Armadillo was kindly presented by Lieut.-Colonel Forrest, C.M.G O.B.E. It was the first specimen of this kind of armadillo which reached the Dublin Gardens. To the regret of the Council, it did not live long; its death was proved to be due to disease of old standing, contracted before its arrival. A beautiful pair of Australian Diamond Pythons and a Boa Constrictor were presented by Professor J. Alfred Scott, and are doing well. In November a pair of Woodward's Kangaroos, a pair of Black-striped Wallabies, a pair of Wombats, and a pair of Phalangers were purchased from the stock brought to England by Mr. Le Souef. Unfortunately, one of the Wombats has died since its arrival. At the end of December a young Woodward's Kangaroo was born, and the Council has hopes that these animals will breed in Dublin, as in former years several Marsupials added in this way to the collection. An appeal for the presentation of native Irish animals has been made by the Council, and has already met with some response. It is hoped that friends of the Gardens who are in a position to do so will present Badgers, Foxes, Stoats, Seals, Hedgehogs, Owls, Swans, and other interesting native animals, with which town dwellers have not usually opportunities of becoming familiar.

The Lions, which have always been the pride of Dublin, and in many ways the chief attraction to the Gardens, are, as regards numbers, almost exactly as in December, 1920. The only change in the list is due to the departure of the young Lioness sent to Toronto. Only one cub was born during the year, and it unfortunately did not survive. The Council hopes that in the near future it may be possible to secure one or more young forest-bred Lions, so that the excellence of the stock as a whole may be maintained. The Council is very grateful to many friends of the Society who most kindly provided horseflesh for the carnivora during a period when it was difficult to obtain in Dublin. Thanks to this kind help, during the whole year there was never any shortage.

The Fishery Conservators, Dublin District, generously made a donation of £10 towards the expenses of the Fish Hatchery in February, 1921; and the Riparian Owners' Association handed to the Council in March a sum of £48 9s. 1d. When accepting the latter gift, the Council formally resolved that the practice of placing all the young fish in the Liffey should be continued. Lord Dunraven presented 10,000 Brown Trout ova in January last, and 18,000 young Brown Trout were successfully transferred from the Hatchery to the waters of the Liffey at Newbridge. At the moment there are 5,000 Salmon ova and 15,000 Trout ova in the Hatchery. The salmon ova are a gift from the Fisheries Branch of the Department of Agriculture and Technical Instruction.

A series of six classes for Girl Guides was held on Saturday afternoons in May and June. Several members of the Council and the Superintendent shared the work connected with the classes, which were attended by an average of just seventy Guides. At the conclusion of the course an examination was held. Thirty-one Guides presented themselves and twenty-nine passed. The answering of Miss Nunan, Miss D. Stanuel (Guiders), and of Miss Noel Klingner and Miss Dorothy Steele (Guides) received special commendation from the examiners.

DUBLIN NATURALISTS' FIELD CLUB.

October 8, 1921.—Excursion to Bray Head. The concluding excursion of the summer of 1921 was favoured by the same genial weather as had been enjoyed on most of the excursions of the past season. Conducted by W. F. Rogers Brambell, the party visited that part of the cliffs noted for the presence of the famous fossil Oldhamia, of which some good examples were collected. Much information as to the birds frequenting the Head and the surrounding sea was imparted by the conductor, and the unusual sight of several Gannets resting on the water close to the rocks excited much interest. A Raven was also seen by some of the members. Among the local plants still in flower were the Tree-Mallow (*Lavatera arborea*) and Rock Sandwort (*Spergularia rupestris*). The large party were afterwards most hospitably entertained by Mrs. Brambell, at Ashbury, where some interesting ornithological specimens were shown by the conductor of the excursion.

SOME HABITS OF THE RED ADMIRAL AND PAINTED LADY BUTTERFLIES.

[Read to the Dublin Naturalists' Field Club, March 9th, 1922.]

BY C. B. MOFFAT, B.A.

THE autumn of last year was remarkable in most parts of Ireland (as noticed by the Rev. W. F. Johnson in the *Irish Naturalist* for December, p. 146) for the surprisingly large numbers of Red Admiral Butterflies (*Pyrameis atalanta*) that made their appearance. Along with them—about Dublin, at any rate—there were rather more than the usual number of Painted Ladies (*P. cardui*).

In late June and early July I had also seen in the lanes round Dublin a sprinkling of both these species. Obviously these would be the insects that laid the eggs from which the September and October swarms resulted.

The Painted Lady is well known to be to some extent a migratory insect, and it is admittedly an open question whether, but for its nomadic habits, we should ever have the pleasure of seeing it in this country. There is no proof that it lives through the winter with us, as the Peacock (*Vanessa io*) and Tortoiseshell (*V. urticae*) do ; yet it is only after hibernation that the eggs are laid, so that a yearly spring immigration of hibernated examples from abroad may be necessary for the maintenance of the species in the Britannic area.

The Red Admiral has been more generally regarded as a resident ; but there is a growing suspicion that it, too—though sometimes seen on the wing here so late as November—fails to live through our winters, and depends on a spring immigration for the renewal of its numbers. There appears to be no trustworthy evidence of a Red Admiral having ever been found in its winter retreat in any part of the British Islands. Far different is the case with both the Tortoiseshell and the Peacock, which can often be seen in their hibernatory sleep in dark crevices and corners.

A further circumstance that seems to tell against the old belief that the Red Admiral hibernates in this country is the extraordinary lateness of its re-appearance in spring. Though the Tortoiseshell is commonly on the wing before the end of March, and the Peacock sometimes in the same month (though more generally in April), the hibernated Red Admiral—and in this respect also it resembles the Painted Lady—is practically never seen until the middle of May, often not till June, and sometimes so late as July. I find, on looking through my Co. Wexford notes, I have fourteen records of the date of the first spring-seen Red Admiral, and of these only four are in May, against seven in June, and three in the first half of July. Of the Painted Lady I have fewer dates—only five—but these all lie between May 21st and June 26th. Is it likely that butterflies would continue their winter-sleep to such dates as these ? I think the lateness of their appearance is a strong additional argument for believing that a regular migration of both these butterflies takes place to our shores during spells of favourable weather in the early summer of every year, and that we owe to the eggs laid by these alien visitors the beautiful insects that delight our eyes when the Michaelmas Daisies are in bloom.

It may seem to some of us a rather tragic conclusion that all these magnificent native butterflies on the approach of winter die unmated, not leaving behind them a single egg to carry on their kind. Doubts will perhaps be felt whether it is in strict harmony with that beautiful Wordsworthian creed as to " Nature's holy plan," about which the President of our Club so lately addressed us. But at least it forcibly recalls the cheery remark of Richard Jefferies, that Nature, scornful of economy, does " everything on a scale of splendid waste." We see only the overflow—the spray tossed on the shore.

I now wish to mention another curious habit of these two butterflies, which came under my notice in the summer of 1920, and which, I think, may be in some way connected with their habit of spring migration.

On the 11th of June in that year, being on a visit to my sister in the northern part of Co. Wexford, I went up a

hill called Boley, or Corrigrua, which culminates in three rocky summits, at heights of about 700 feet. On one of these peaks (the southernmost of the three) I saw, not far from each other, a Painted Lady and a Red Admiral Butterfly, each seated on a stone. They were the first I had seen that summer, and it struck me as singular that they should both have turned up at so exposed a spot. But presently another Red Admiral appeared, swooping towards the same spot; on which the Red Admiral in possession flew up and attacked the new comer, chased him away, and then returned victoriously to re-seat himself on his stone.

On that afternoon I saw only the one encounter; but two days afterwards I went up the hill again and saw a long series, all on the same little peak, and found that the top of this hill was a regular tilting-ground, both for Red Admirals and for Painted Ladies. I can't say how many there were. There were seldom more than two of each species in sight at the same time; but the procedure was for one of each kind to sit on its basking-stone till another of the same kind (and this happened very often) came plunging towards it, whereat the butterfly in possession at once flew up and seemed to give battle, driving the new comer some distance away. The battle always ended in the return of one of the combatants to the coveted vantage-ground.

Two days later still (on June 15th) I found that the peak was still being used as a tilting-ground, and this time certainly by considerable numbers both of Red Admirals and of Painted Ladies—the battles going on in such rapid succession that a second sometimes began before the first-engaged pair were out of sight—though neither of the two other very similar peaks on the same hill attracted any of the butterflies. I went up again on the 16th and 20th, and found the tournament still in progress. It was a very showy tournament, the blazonry on the butterflies' wings making a beautiful display as they circled round each other in the air. Meanwhile in all the rest of the country surrounding the hill one might walk for miles and not see a butterfly of either species.

What attractions the barren peak in question possessed it is impossible to say. It was certainly not prolific in the food-plants of either insect, nettles being absent, and thistles small and sparse.

If we regard these insects as newly-arrived migrants, their occupation of the hill-top may merely indicate that it lay in their line of flight. Having travelled, as they probably did, at some height over the sea, they may find these elevated spots the most suitable for alighting, and may have used them as landmarks. That, however, does not help to settle the question, "what they fought each other for."

After my return to Dublin I heard from a lady living in another part of Co. Wexford (Miss Deane, of Longraigue), that she had been surprised at finding a large assemblage of Red Admirals on the top of Carrickbyrne—a hill of character very similar to that of Boley. But I should add that when visiting the neighbourhood of Boley again in August, when newly-hatched Red Admiral and Painted Lady butterflies were to be seen in the lowlands, there were none to be found on the hill-top where they had been so conspicuous all through June. So the habit of gathering and holding tournaments in such places, whatever its object, would seem to be a peculiarity of the butterflies' pairing-season.

I would refer here to the interesting account given by Mr. Praeger in the *Irish Naturalist* for last August (p. 97) of the behaviour of a Silver-washed Fritillary (*Argynnis paphia*), which he watched for some time flying up and down a regular beat of about 100 yards. On the appearance, every now and then, of a second butterfly, "the two would whirl up high in air, and fly to windward till lost to sight; but in a minute one—presumably the same—would return and resume its patrol." Regarding these upward flights as acts of courtship, Mr. Praeger was naturally a bit surprised to find that when he took to throwing stones near this patrolling butterfly it gave chase to the stones just as it had given chase to the other butterflies. But is it not much

more probable that a butterfly in charge of an area (as this Fritillary seems to have been) would mistake the flying stones for objectionable invaders to be chased off the course than that it would take them for desirable mates ? I would suggest that Mr. Praeger's Fritillary was pursuing on a more modest scale the very same strategy as were the large numbers of Red Admirals and Painted Ladies that I had been watching the summer before on the top of Boley.

The battles on Boley must have had an object—systematically carried on as they were, day after day, by considerable numbers of both kinds of butterflies, probably throughout the whole of June. It was certainly the mating season ; but no mating took place. I can only suggest that the combatants on the mountain-top were all males, and that the object of each in attacking new comers was to keep the ground to himself in the hope that ultimately a female would appear. If I am right it would seem to follow that males are much the more numerous sex—or at least the more addicted to migration. In any case, it seems worth inquiring whether these remarkable butterfly-tournaments are fought on many Irish hill-tops, and whether the same tilting-grounds are patronised year after year.

Dublin.

THE IRISH NATURALIST.

Readers of this Magazine will be delighted to see on the cover that Robert J. Welch, of Belfast, has consented to resume his work as one of the editors. His co-operation, always welcome and helpful, will be especially valued by his colleagues at the present time of exceptional difficulty.

DIPTERA AND HYMENOPTERA AT POYNTZPASS IN 1921.

BY REV. W. F. JOHNSON, M.A., F.E.S.

THOUGH the summer of 1921 was a very fine one, yet Hymenoptera were anything but abundant ; an apparent anomaly, but really so, for the abundance of these insects in any given year depends on the character of the weather of the preceding year. Now 1920 was most unfavourable to Hymenoptera with the result that they did not appear in their usual numbers in 1921. We will hope that, favoured by the fine summer of 1921, Hymenoptera may prove to be numerous this year. Another factor, which militated against insect life last year, was the very great changes of temperature which occurred in the early season. Thus April 11th was a very fine hot day and numerous insects were about, but on 14th and 15th there was snow and severe frost ; this sudden change would kill a number of these early insects and thus interfere with the second broods.

I particularly wanted to obtain specimens of the Irish varieties of *Andrena Jacobi*, but only met with a single specimen of each form, a very great disappointment to me. Towards the end of July, Humble Bees (*Bombi*) became pretty numerous, crowding on to the flowers of Ragweed, where they were to be found quite late in the evening ; I took some at 9 p.m. They were accompanied by Flies (Diptera) and Ichneumon Flies, but not very many of the latter. Most of the Ichneumon Flies were taken in my fields, the flowers of Hog-weed and Angelica, as usual, yielding a good harvest. *Amblyteles amatorius* seems to be rare. I took it as it was crawling among stones on a fence, and from its appearance I think it was freshly emerged. It seemed much insulted by my seizing it, and assaulted my finger with its mandibles and terebra, I need hardly say without producing any effect. It is a very handsome insect, the red and black of its abdomen forming a pleasing

and striking contrast. I think it is unfortunate that two insects of the same genus should have names so very nearly alike as *A. amatorius* and *A. armatorius*, differing as they do by merely a single letter, but the law of priority, like Gallio, cares for none of these things.

I was again successful in rearing *Orthopelma luteolator* from *Rhodites rosae*. I picked the bedeguar in a hedge by the roadside in September, 1920.

I was quite glad to meet with so many of the pretty *Pimpla oculatoria*, a species which I had not seen for some years. It is said to prey upon spiders, laying its eggs among their eggs and the resultant grub eating the eggs of the spider. Mr. Morley[1] gives a most interesting account of the larva, which he found in the egg bag of the spider *Epeira diademata*. I find that I have not taken this species since 1912, a period of nine years. How it eluded me for so long I cannot understand. It must have been there, and it is not an insect of a short period, for I took it at Carlingford in June and at Poyntzpass in July and August, giving it a period of three months on the wing. It is one more instance of the extraordinary way in which insects can elude human observation, as witness J. H. Fabre's search for *Cleonus ophthalmicus*, the weevil which a hunting wasp (*Cerceris tuberculata*) was carrying to her nest frequently but of which two days' search produced for him only three maimed specimens (*vide* " Hunting Wasps," p. 34).

DIPTERA.

Pipiza bimaculata Meig.—Garden, April.
Chrysogaster splendens Meig. } At Angelica, August ; the latter also in
C. solstitialis Fallen, } July at Hogweed.
Chilosia illustrata Harris.—Field, July.
Pyrophaena rosarum Fab.—Field at Knapweed, August.
Catabomba pyrastri L.—On Ragweed, 8.30–9 p.m., July.
Syrphus balteatus De Geer.—Field, July.
Sphaerophoria menthastri L. var., **picta** Meig.—Field by sweeping } August.
Xanthogramma citrofasciatum De Geer.—Field at Angelica }
Baccha obscuripennis Meig.—Flying round clematis, September.
Volucella bombylans L.—Hill, July.

[1] " British Icheumons," vol. iii., p. 114.

Eristalis intricarius L.
E. arbustorum L.
Helophilus pendulus L.
} Field at Knapweed and Ragweed, August.

Syritta pipiens L.—Field, July; at nettles, October.

Sargus bipunctatus Scop.—Window, July.

S. flavipes Meig.—Field at Knapweed, August. I received a specimen of this handsome fly taken by my friend, Mr. W. A. Hamilton, at Coxtown, Co. Donegal, in September.

Microchrysa flavicornis Meig.—Field, July.

HYMENOPTERA.

ACULEATA.

Crabro clavipes L.—Field, August.

Andrena Jacobi Perks. var. **scotica** Perks., and var. **Johnsoni** Perks.—Garden, May.

Psithyrus campestris Panz.
Bombus derhamellus K.
} Field at Ragweed, July.

B. hortorum L.—Field at Angelica, August.

TENTHREDINIDAE.

Trichiosoma lucorum L.—On flowers of Broom, May.

Trichiocampus eradiatus Ratz.
Pontania vesicator Bremi.
} Emerged, April. I also took the latter by sweeping grass in May.

P. viminalis Htg.—Emerged, May.

Pteronidea oligospilus Forst.—Emerged April, May.

P. fagi Zadd.—Emerged July.

Pachynematus clitellatus Lep.—Emerged May; field at Angelica, August.

P. obductus Htg.—Emerged May.

P. trisignatus Forst.—Field at Angelica, August.

Lygaeonematus compressicornis F.—Roadside
Dolerus picipes Kl.—On lawn in water trough
D. oblongus Cam.—Roadside
} May.

Tenthredopsis palmata Geoff.—Emerged May. This specimen has two cross nerves in the radial cell of the left forewing.

T. spreta Sep.—Hill, July.

Allantus Perkinsi Morice.—On flowers, May and August.

Tenthredella livida L.—Roadside, May.

CYNIPIDAE.

Rhodites rosae L.—Emerged May.

ICHNEUMONINAE.

Barichneumon lepidus Gr.—Field, August.
Spilichneumon occisorius Feb. var. **nigrinus** Berth.—Field at Hogweed, July.
Amblyteles amatorius Mull.—Field, September.
A. armatorius Forst.—Field, July.
Phaeogenes stipator Wesm.—September
P. melanogonus Gmel.—August
} In fields.
Dicaelotus pumilus Gr.—Moss from Demoan Wood, January.
Centeterus opprimator Gr.—Field by sweeping, September.

CRYPTINAE.

Helcostizus brachycentrus Gr.—Hill, September.
Microcryptus nigrocinctus Gr. var. **jucundus** Gr.—Sweeping grass, September.
M. micropterus Gr.—Sweeping, 8.30—9 p.m., July.
Phygadeuon rusticellae Bridg. var. **subtilis** Gr.—Hill, April.
P. inflatus Thoms.—Field at Angelica, August.
Orthopelma luteolator Gr.—Emerged April, May.
Hemiteles bicolorinus Gr.—Study table, September.
H. areator Panz.—Study window, October.
H. cingulator Gr.—In store-room, January 6th.
Cecidonomus gallicola Bridg.—Hill, May.

PIMPLINAE.

Ephialtes carbonarius Christ.—On window, June.
Perithous mediator Fab.—In window, June; flying in sunshine at ivy, September.
Pimpla oculatoria Fab.—Fields, July, August.
Glypta fronticornis Gr.—Field, August.
G. trochanterata Bridg.—Field at Knapweed, July.
Lissonota variablis Hlgr.—Sweeping, 8.30 p.m., July, at Angelica, August.

TRYPHONINAE.

Exochus podagricus Gr.—Roadside at Hogweed, August.
E. squalidus Hlgr.—Field, August.
Bassus tricinctus Gr. var. **nemoralis** Hlgr.—In house, May; field, September.
Homocidus obscuripes Hlgr.—Sweeping, May.
H. elegans Gr. var. **rufonotatus** Hlgr.—At Angelica, August.
H. signatus Gr.—Field, September.
Promethus albicoxis Thoms.—Field at Angelica, August.
Mesoleptus ruficornis Gr. var. **comptus** Hlgr. September
M. indefessus Gr.—August
M. typhae Fourc.—May
Exenterus flavilabris Hlgr.—September
} in fields

OPHIONINAE.

Campoplex foveolatus Forst.—On Ragweed 8.30-9 p.m., July.
Sagaritis declinator Gr.—Fields June and August.
S. latrator Gr. }
S. annulata Gr. } Fields at Angelica, August.
Limnerium albidum Gmel. var. **juniperinum** Hlgr.—Field, July.
L. xanthostoma Gr.—Garden on grass, May.
Omorga mutabilis Hlgr.—At Angelica, August.
O. multicincta Gr. }
Meloboris ischnocera Thoms. } Caught by hand on herbage in September.
Angitia fenestralis Hlgr.—Sweeping grass }
Anilasta ruficincta Gr.—Roadside } May.
Holocremna clandestina Hlgr.—Window, August.
H. erythropyga Hlgr.—Field, September.
Ophion scutellaris Thoms.—Garden, on under-side of laurel leaf, July.
Mesochorus anomalus Hlgr.—Window, July.

BRACONIDAE.

Bracon variegator Nees.—Sweeping }
B. anthracinus Nees.—At Hogweed } August.
Sigaliphus striatulus Nees.—Garden, April.
Rhogas irregularis Wesm.—Field at Hogweed, July, August.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

April 25.—Annual Meeting.—The annual meeting was held in the Museum, College Square, North—the Vice-President (Rev. W. R. Megaw, B.A.) in the chair. The reports presented by the Committee showed that the Club was still in a very satisfactory position, the total membership being now 456, an increase of 130 members over the previous year. The officers appointed for the coming session were as follow:—President, Rev. W. R. Megaw, B.A.; Vice-President, J. A. S. Stendall, M.B.O.U.; Hon. Treasurer, T. Edens Osborne, F.R.S.A.I.; Hon. Librarian, W. M. Crawford, B.A. I.C.S., F.E.S.; Hon. Secretary, A. M'I. Cleland; Hon. Secretaries (for geology), R. Bell, F.Min.S.; (botany), S. A. Bennett, B.A., B.Sc.; (zoology), W. A. Green; (archæology), A. Albert Campbell, F.R.S.A.I.; (junior section), J. R. H. Greeves; Ordinary Members of Committee, Miss S. Blackwood, Professor J. K. Charlesworth, D.Sc., M.R.I.A.; F. Adens Heron, J.P.; A. Percy Hoskins, F.I.C., F.C.S.; and W. Porter.

There was on view during the evening a fine collection of mounted photographs on loan from the North Staffordshire Field Club. The Hon. Secretary showed an Orthoceras recently taken from local boulder clay. R. J. Welch, M.R.I.A., exhibited an album containing almost one hundred book plates designed by John Vinycomb, M.R.I.A., an hon. member and ex-President of the Club. These included a number of book plates of well-known Irish naturalists and antiquaries. With the election of two new members the meeting was brought to a close.

March 21.—Nevin H. Foster gave a lecture on "Birds, extinct and living." The Chair was occupied by the President (S. A. Bennett), who, before introducing the lecturer, referred to the fact that two of the members (A. Deane and Professor J. Small) had recently been elected to the Royal Irish Academy.

Mr. Foster said that birds had evolved from reptiles, for the skeletons of both bear a close affinity; but birds had progressed much further, as, owing to their possessing a four-chambered heart, they were able to keep their bodies at a uniform temperature despite the varying heat of their surroundings. Birds and mammals agreed in this respect, and together were classed as warm-blooded animals. The covering of reptiles consisted of scales, and it was probable that the feather had been developed from a frayed scale. Though of this no actual proof could be advanced, it was worthy of note that the feet and legs of birds are still covered with scales similar to those borne by reptiles. From fossils which had been found it was possible to make the picture of the oldest-known bird, the Archæopteryx. This bird, which was about the size of a Rook, was clothed in feathers precisely the same as are found on all birds, but it showed remarkable differences to all living birds in the possession of true teeth in the jaws and the structure of the tail. Other extinct birds alluded to included the Hesperornis, Ichthyornis, Moa, Dodo, and the Garefowl, or Great Auk, &c.—bones of the last-named of which had been found in County Antrim.

Mr. Foster then proceeded to speak about some living birds, choosing for representation a few species found respectively in Europe, Asia, Africa, and Australasia.

The lecture was illustrated by a series of very fine slides, and at its conclusion a discussion followed, in which J. A. S. Stendall, J. Holness, and S. M. Macoun took part. The meeting concluded with the election of John Vinycomb, M.R.I.A., as honorary member, and G. W. C. Porter and W. J. Knight as ordinary members.

March 28.—Annual Conversazione.—The members held their fifty-ninth annual conversazione and exhibition, when a company of 160 members and friends met at 6 o'clock in the Carlton Hall. A large series of zoological, botanical, geological, archaeological, and historical exhibits were shown. The President (S. A. Bennett) in a short address, reviewed the work of the past session. Five new members were elected.

NOTES.

ZOOLOGY.

Curlews' Eggs in Wild Duck's Nest.

Some three weeks ago I found a duck's nest (Mallard) in the bog here and it contained ten duck-eggs. About a week later I again passed the spot, the duck flew off, and the eggs were there as I found them on the first occasion. At a third visit the duck was not disturbed and I observed her at a distance of about four yards, for several moments. Now comes the incident of interest. On the 9th inst. I again passed the nest and got within a few yards of the sitting duck; she flew off after a second or two, and on looking into the nest found not ten duck-eggs, but three Curlew's eggs, and the duck is hatching these eggs at the time of writing. On the question of the identity of the eggs there can be no doubt as Curlews are quite common in the locality and I have often found their nests.

Can any readers offer an explanation as to how the change of eggs took place? The obvious one, of course, is that some persons other than myself, found this nest, took away the duck-eggs and substituted Curlews. Personally I do not accept this theory, as while local boys might, and probably would, rob the nest, they would not, in my opinion, take the trouble or even think of replacing the stolen eggs with others.

Auburn House, Athlone. R. Pack Beresford.

The Zoological Record.

I desire to draw the attention of readers of the *Irish Naturalist* to the present position of the *Zoological Record*.

Owing to the collapse of the International Catalogue of Scientific Literature in connection with which the *Record* was published from 1906 to 1914, the Zoological Society of London has undertaken to bear the whole financial responsibility for the preparation and printing of the *Record*. Owing to the great increase of the cost of printing and to the very meagre support accorded to the *Record* by zoologists and zoological institutes generally, the financial burden of this undertaking on the Zoological Society is becoming very severe. The cost of printing the *Record* now amounts to between £1,500 and £2,000 annually, and the Society receives back by subscribers and sales less than 25 per cent. of this sum; I fear, therefore, unless zoologists are prepared to make greater efforts to support the undertaking, there is a strong possibility that the Council of the Zoological Society may refuse to find this large sum each year. It appears, therefore, to be the duty of every zoologist to help so far as he is able to support this most invaluable work. All particulars and forms of subscription can be obtained from the Secretary of the Zoological Society, Regent's Park, London, N.W. 8; but I may mention that the price of the whole volume is now £2 10s. 0d., and the price of the separate parts a proportional smaller sum.

W. L. Sclater, Editor,

Regent's Park, London.

SOME NOTES ON THE IRISH SHEEP.

BY R. F. SCHARFF, B.SC., PH.D.

A FEW years ago I described an ancient Irish breed of the Pig[1] and made some comments on its probable origin. The old breeds of other Irish domestic animals are fast disappearing. Some of them have entirely vanished, and every effort should be made to preserve the available records of the old Irish farmyard stock.

One of the most interesting subjects of enquiry which has been sadly neglected is the past history of the Sheep in Ireland. There are scattered references to sheep in old books and records, but we possess few, if any, very accurate descriptions which would enable us to supply a vivid picture of the striking features of the ancient Irish sheep. My object in presenting these short notes to the readers of this Magazine is not only to tell them what I know about the subject but to elicit information. Others may be able to add a good deal to my remarks. And this will give them an opportunity of weaving together a more connected story of the past history of the sheep in this country.

It is scarcely necessary to deal with the breeds of sheep now found in Ireland, for it is quite evident that most of them were brought over from Great Britain and other countries within the last hundred years. The original Irish breeds have apparently been so modified by being crossed with these introduced sheep, that we can scarcely recognise them. The only distinctly Irish breed at the present time is the Roscommon sheep which seems to be the product of the native long-woolled race and a Leicester stock. Previous to these introductions which were conducted on an extensive scale in modern times, sheep no doubt were conveyed to this country occasionally from other parts of the world. It is doubtful, however, whether they had any great influence in modifying the old Irish breeds. Of these there were two, viz., the long-woolled and the short-woolled breed. The latter was chiefly found in

[1] *Irish Naturalist*, vol. xxvi., 1917.

County Wicklow where it had established itself apparently from time immemorial. This sheep has been described as having a small head, narrow face, and short, round, and pricked ears. The head and face were smooth and covered with short hair, the wool extending only to the junction between neck and head. It had a long neck, but the general proportions were good except that it was rather too slender. The legs were small and clean and not very long. The tail had remarkably coarse hair, even more so than that of the long-woolled sheep. The fleece was coarse or wavy and occasionally matted, yielding from two to three lbs. of wool with a fibre of about two inches in length. The wool of this sheep was largely used in the manufacture of flannel of which much was made at Rathdrum. An anonymous writer who signs himself "Agricola" wrote[2] in 1806 that this Wicklow short-woolled breed was generally known as the "Cottagh Sheep" and that the Bradys of Glenmacnass kept large flocks of the pure-blooded stock.

Lydekker[3] writes as if the Wicklow sheep were still living, whereas it has long since been crossed out of existence. What was the general distribution of this race in Ireland? That is one of the questions to which we should like an answer. Youatt[4] maintains that a similar breed occurred in Galway, particularly in the Connemara mountains. It seems to have been crossed there earlier than in Wicklow with the English South Down breed and the Spanish Merino. He tells us that the mountains of Kerry also produce a breed of small-woolled sheep. But according to Low[5] the Kerry sheep were larger than the Wicklow. The horns were small and crooked and occasionally absent in the female, while the wool was coarse on the haunches and fine on the sides. The tendency of these sheep to become black will be alluded to again later on.

---

[2] Agricola—"Essay on the properties of neat Cattle, Sheep, and Swine." *Trans. R. Dublin Society*, vol. v., 1806.

[3] Lydekker, R.—"The Sheep and its Cousins." London, 1912.

[4] Youatt, W.—"Sheep, their breeds, management and diseases." London, 1837.

[5] Low, D —"On the domesticated animals of the British Islands." London, 1845.

It seems as if the short-woolled, which was a small breed of sheep, was confined to the mountains, and it probably is the older of the two races. Of the long-woolled breed we know even less than we do of the other. Youatt tells us that it was a large sheep whose head was completely covered with wool. The wool extended on the legs to the very feet, and it had large flagging ears. This breed was generally distributed over the plain of Ireland. We know nothing about the length of the tail in either of these breeds and it is a character of some importance.

Giraldus Cambrensis who visited Ireland in the 12th century describes[6] the Irish monks as being lightly clad in woollen garments, barbarously shaped, and for the most part black, because the sheep of the country are black. The term "black" should not be taken too literally. In every large flock of white sheep a few dark ones are born even now-a-days. But these are not black. The colour should be described as a shade of brown. And it is quite likely that long ago sheep were almost all brown. The dark colour no doubt was eliminated by selection when it was found desirable to dye wool in various bright colours.

I am not acquainted with any older references to the sheep in Ireland than those alluded to, but it is quite certain that domesticated sheep lived in this country long before the 12th century. All the older remains of the sheep found in Irish caves belong to a small race with slender, delicate limbs which were somewhat goat-like in character. Mr. Blyth[7] speaks of the former occurrence in Ireland of two races of sheep one of which was polycerate (*i.e.* many-horned), while the other seemed not to differ from the old Scottish Highland breed. He expressed the opinion that these races were much older in Ireland than the goat. Now as regards the fact that some of the sheep skulls found in the raths and crannogs of Ireland were four-horned (or what Blyth calls polycerate) this is by no means

---

[6] Giraldus Cambrensis.—"The Topography of Ireland" (revised and edited by Th. Wright), 1881.

[7] Blyth, E.—"On the animal inhabitants of ancient Ireland." *Proc. R. Irish Acad.*, vol. viii., 1861-64.

a character distinctive of any particular race. In the Loaghton breed of the Isle of Man, in the Iceland, Shetland and Soay sheep there is the same tendency to develop extra horns. There may be three or four, occasionally even six horns. As all these sheep are typically brown in colour, short-woolled with the wool extending only to the junction between head and neck, and possess short and slender limbs they seem to resemble, in some respects, the Irish mountain breed which was probably the descendant of the ancient breed whose remains occur in the caves. The long-woolled breed may have been introduced much more recently, possibly from France or Spain.

There is considerable diversity of opinion as to the origin of domesticated sheep. But as far as European breeds are concerned, it seems likely that the wild sheep of Sardinia (*Ovis musimon*) was the principal ancestor. The Moufflon, as it is often called, had a much wider distribution in Southern Europe long ago than at present. The sheep inhabiting the small island of Soay off the west coast of Scotland are said[8] to bear a remarkable resemblance to the Moufflon. The latter and the Soay sheep breed freely together and form fertile offspring. In Sardinia natural hybrids between the Moufflon and domesticated sheep have been known for centuries. It is of interest to record that the remains of a sheep have been discovered in the Swiss lake-dwellings which Dr. Duerst identified with this hybrid, and he states that the same breed or variety has also been met with in various recent English deposits.[9]

The remains of ancient sheep from Irish crannogs in the Dublin National Museum are very fragmentary, although the horn-cores are generally well preserved. Their structure and curvature has such a strong resemblance to the horn-cores of the Moufflon that a close relationship of the two is indicated.

Knockranny, Bray.

[8] Elwes, H. J.—" Notes on the primitive breeds of sheep in Scotland." *Scottish Naturalist,* 1912.

[9] Duerst, J. M.—Uber ein neues prähistorisches Hauschaf und dessen Herkunft. *Vierteljahresschr. d. Naturf. Gesellsch. Zurich,* Jahrg. xlix., 1904.

FURTHER OBSERVATIONS ON THE LIFE-HISTORY OF WARBLE-FLIES.

BY PROF. GEORGE H. CARPENTER, D.SC.

EIGHT years ago an article appeared in the *Irish Naturalist*[1] in which a summary was given of observations made by the late Thomas R. Hewitt and the writer on the behaviour of the newly-hatched larvae of *Hypoderma bovis* and *H. lineatum*, these observations confirming the conclusions arrived at from experiments with muzzled calves that the young maggots bore directly in through the skin close to where the eggs are laid on the hairs, and make their way thence through the tissues to the wall of the gullet, and later to the well-known stations beneath the skin of the back where they ripen during the spring months.

Further details of these observations were shortly afterwards published.[2] Since then the work has been continued, and a summary of the results of biological interest from the latest report[3] on the subject may be acceptable, as these offer strong confirmation of the conclusions previously set forth.

Muzzling experiments were continued at Ballyhaise during the summer of 1914 on nine muzzled and seven "control" calves. The former had 261 warble-maggots in the spring of 1915—an average of 29 per beast; the latter had 62 warble-maggots—an average of less than 9. It seems therefore not merely that muzzling affords no protection, the maggots never finding effective entrance into the host-animal by way of the mouth, but that cattle free to lick their skins may destroy or dislodge many eggs that have been attached to their hairs.

But it was desired to supplement these muzzling experiments and the direct observations made of the young maggots' entrance through the skin, by experiments in

---

[1] vol. xxiii., 1914, pp. 214-221.

[2] *Journ. Dept. Agric. and Tech. Instr., Irel.*, vol. xv., 1914, pp. 105-132.

[3] *Ib.*, vol. xxii., 1922, pp. 14-25.

feeding calves—otherwise preserved from infection—with eggs or young larvae of the warble-flies ; and also to see if young larvae observed to have bored in through the skin could be proved to ripen under carefully controlled conditions, no other infection of the experimental cattle by Hypoderma being allowed. Trials on both these lines were made, and while those testing entrance by the mouth were entirely negative in result, those with the boring-in maggots were conclusively positive. The experimental work was carried out with great care and skill by my late colleague, Thomas Slattery, A.R.C.Sc.I.

During the summer of 1915 six calves were fed with 100 young maggots each and one with 45. Three of these animals were slaughtered in the autumn, but no second stage larvae were found in their gullets. The remaining four were found to be entirely free from ripe warble maggots in the succeeding spring.

In the course of the same summer three housed calves at Athenry had a number of maggots that had just been hatched in an incubator placed on the skin of each—over the hip or shoulder, or on the hock. Nearly a hundred larvae were placed on each of two calves, and forty on the third. Two of these animals were killed in October, and a single second-stage maggot was found in the sub-mucous coat of the gullet of one of them. The third had no ripe warble-maggots next spring. It appeared that experimenting with incubated larvae might be too unnatural a mode of working, so during the fly-season of 1916 at Athenry four calves, kept continuously in the house, had eggs, laid by captive flies, bandaged on to their legs under celluloid strips, while four others were taken on one day only into a field where cattle were grazing and "gadding," and tied up for an hour in a small enclosure under close observation, their bodies completely covered by clothing except the hind limbs on which flies could therefore lay eggs under natural conditions. The results proved most interesting. None of the cattle on whose legs the eggs had been bandaged had any ripe marble-maggots next spring. Here again the conditions were evidently too abnormal for success. But of the four on which eggs were

on one occasion naturally laid, the three that survived all had many ripe maggots. One of these, seen to have been "struck" 187 times by a female *H. bovis*, had 41 maggots all of that species; another "struck" 73 times had 23 maggots; another seen to have been struck 14 times had 13. In all cases the fly seen to lay eggs and the resulting ripe maggots were of the same species. All the eggs were laid below the hock on this one carefully controlled occasion; the calves were kept housed through all the rest of the summer so that they had no other chance of infection, and for a week after exposure to the attack of the flies they were always muzzled or tied so that there was no possibility of their licking and swallowing either eggs or young maggots.

It appears conclusively from these experiments and observations that from eggs laid naturally on the legs of cattle young maggots of *Hypoderma bovis* bore into the body of the host and become "ripe" in the succeeding spring beneath the skin of the back, also that a bored-in maggot may reach the sub-mucous coat of the gullet-wall. Such proof of the extensive migrations of the larvae is of special importance in view of the opinion sometimes confidently expressed that only eggs laid on the back give rise to larvae that can complete their development. Eggs appear to be hardly ever laid on the back at all, and we are now assured that maggots which bore in at the heel do reach the back and there become "ripe" in readiness to change into the flies of the next summer.

Royal College of Science, Dublin.

IRISH SOCIETIES.

DUBLIN NATURALISTS' FIELD CLUB.

May 27.—Excursion to Donnybrook.—A large number of members and friends met at the tram terminus and were conducted by Prof. A. Henry first through the grounds of Nutley, which is noted for its fine trees and beautiful garden. The owner, Mr. Sharman Crawford, kindly received the members. Attention was directed to the profuse flowering this season of many species, *Fraxinus ornus* being very conspicuous. The party next walked to Merville, also celebrated for its magnificent garden. The place was laid out by Baron Foster towards the end of the 18th century, and some of the original trees remain, the finest being a large Oriental Plane. From Merville the members proceeded to Woodview, where tea was hospitably provided by Prof. and Mrs. Trench. Afterwards various trees were observed and discussed, special attention being paid a fine *Robinia Pseudacacia*, and to two gigantic Black Italian Poplars, which had just come into leaf, justifying the name given to the hybrid by Hartig, *Populus serotina*.

BELFAST NATURALISTS' FIELD CLUB.

May 27.—Travelling to Whitehead, the Club's first excursion of the season took place to Cloughan Point. The party of eighteen were conducted by R. J. Welch, an old President of the Club, who described many of the features on the walk, calling on Captain Chase, M.A., for the botany, and Robert Bell, F.Min.S.L., for descriptions of many geological objects of interest to the mineralogist and palaeontologist. Taking the road past the columnar basalt quarries, a section of Greensand was shown, from which many fossils have been collected. Nearer the tunnel, on the shore, the outcrop of Chloritic Sand, which yields many specimens of fossil sponges, was pointed out by Mr. Bell, who also described the high section of basaltic rocks above the tunnel, from which so many fine specimens of zeolites have been obtained by him. These now form part of the national collection of zeolites in the Natural History Museum, London. Just south of the tunnel on a bank beside the railway, the locality for the very local maritime trefoil, *Trifolium striatum*, was shown.

Passing along by the old harbour, from which so much chalk (the "white limestone" of County Antrim) was formally shipped from the now worked out quarries above, the calcreted glacial gravels overlying the Chalk and under the Boulder Clay were described by the conductor, who mentioned the abundance of fossils found in them, mainly in "pockets," more or less isolated in the mass, the species present having a more northern facies than those living now in local waters. Portions of the chalk cliffs, moved out of place by the ice movements and arrested when starting on their journey as erratics, are here more clearly seen

than elsewhere in the county. Another glacial gravel section was seen at Cloughan Point high up, last of the big volcanic dyke of rapidly weathering basalt. It runs out to sea, forming the Briggs Reef, a favourite roost of Cormorants at low water, fourteen of which at its seaward end were counted by the party. This and a smaller dyke also penetrating the softer Triassic marls seem to have determined the Point. South of this, the Raised Beach was seen to be about twelve feet above present high-water mark, sloping down to the south to about eight feet or so. Many of its fossil marine shells were collected. All were common littoral species of N.E. Ireland. A few very rude flints were also collected, mostly keeled flakes much beach-rolled. On returning to Whitehead the party were the guests for tea of a member of the Club, Mr. Franklin M. Walker and his wife, who did all they could to make the visit a pleasant one. After tea, the usual business meeting was held, when nineteen new members for the senior and ten for the junior section were duly elected. The party returned to Belfast by the 6.30 train.

NOTES.

ZOOLOGY.

Combats of Butterflies.

It may interest Mr. Moffat to hear that the June number of the *Irish Naturalist* containing his paper on the habits of butterflies was delivered to me while I was watching fights between Red Admirals and Painted Ladies in a big patch of flowering broccoli in our garden here on the coast. These tilting matches have been taking place all day for the last three weeks.

The Painted Ladies fight the Red Admirals more ferociously than the Red Admirals fight between themselves. In every case the victorious insect returns to bask while feeding on the flowers of these broccoli. The butterflies even chase and disperse various Bumble and Sand Bees that are attracted by the blossom.

I have never seen so many Red Admirals or Painted Ladies here before, and their wings are so perfect and so bright in colour one doubts if they could have immigrated *here* from the continent and kept such immaculate and brilliant condition.

J. N. Bingham.

Belmullet, Co. Mayo.

Butterfly Habits.

The interesting article by Mr. C. B. Moffat in the June number reminded me at once of a somewhat similar occurrence which I noticed in 1888. I was in North Wales, and on the 19th of July, a very hot

day, I well remember, I went up Cynicht, and on the summit (2,265 feet) I was very much struck with the evolutions of a Red Admiral and a Painted Lady. I did not, I think, observe them very closely, so that I cannot say that they were actually tilting as described by Mr. Moffat, but I remember that they were very much in evidence for some time; so much so that I find I referred to it in the brief entry I made in my diary, viz. :—" A pair of very fine Falcons attended me on the top; also a Red Admiral and Painted Lady." It struck me at the time as an unusual spot to find these Butterflies, and so far as it goes—though it is not very far—it confirms Mr. Moffat's view that there must be some special attraction to account for their choice of such a *venue*.

H. N. Dixon.

Northampton.

Trichoniscus roseus at Belfast.

The first record from North of Ireland of this small species was by Dr. R. F. Scharff in this Journal, vol. iii., p. 26, of specimens in shell-marl that I obtained from near Portaferry, Co. Down. The marl had been in my yard for some little time and I was always in doubt where the woodlice came from. To-day—May 28th—I find a number among stones in front garden of my house, an area only a few yards square, where no plants whatever have been introduced for over seven or eight years. I have never seen them there before though I have often hunted among these stones for worms and woodlice.

R. J. Welch.

Belfast.

The Brown Lizard, Lacerta vivipara, at Whitehead.

While the Belfast Naturalists' Field Club party were walking along the railway to Cloughan Point, Belfast Lough, this May, Captain Chase caught a specimen of above beside the railway lines. In all my fifty years' travelling and collecting in Ireland, this is only the third specimen I have ever seen in the open. The first in a bog near Newtownards, Down, in 1878, the second on a bank beside the station at Whitehead (an old railway carriage!) a year or two later. It is probably more abundant than is generally supposed, but its protective colouration renders it hard to see. The *Zoologist* for June, 1860, p. 7172, records " vast numbers " as appearing in Co. Down that year.

R. J. Welch

Belfast.

Squirrels in Co. Cork.

Until reading Dr Scharff's interesting paper in the May number of the *Irish Naturalist* I had no idea that the Squirrel had been unrecorded in Co. Cork. I have met with it fairly often about Fermoy for some years past. At one time it certainly was absent or extremely scarce here, but about twelve years ago I began to see it occasionally, and it was, I think, in greatest numbers about five years ago. Since then the continual cutting down of our woods has reduced its numbers again. About eight or nine years ago, very early one summer morning, I awoke to find one sitting on the sill of my open window. It ran along a ledge, down some creepers, and I watched it scampering across the grass in our garden into the shrubbery. Later one was killed by a dog in our conservatory, and since then I have occasionally seen an odd one, and others have been reported to me, about the shrubs in our garden, close to which is a thick row of beech trees. In Castlehyde demesne and Glenabo wood I have frequently seen it, but never in numbers, and occasionally in other smaller woods around also. Being under the mistaken idea that the presence of the Squirrel in this county was well known, I regret I did not keep the actual dates, but certainly five or six years ago I could have shown them to anyone almost any day around here. At the present time they have become scarce again, possibly owing to the destruction or thinning of our woods, and I have seen none lately.

In the extreme south-west of this county, on the peninsula between Dunmanus and Roaring Water Bays, there was a saying that in olden times " a Squirrel could go from Skibbereen to the Mizen Head on trees without coming to ground." Whilst I am not going to vouch for the accuracy of this statement, I think it is significant that the name " Squirrel" should be known at all in a country which has been practically devoid of trees for centuries. A more unfavourable country for Squirrels can hardly be imagined. Of woods there are none. A few small groves of stunted growth, five to eight miles of rocks and bogs separating them from one another, is not the sort of place one would expect to find Squirrels. The fact then that such an animal is well known by repute in that country is, I believe, at least, suggestive of its former existence there.

W. M. Abbott.

Fermoy.

The Squirrel in Ireland.

In his interesting paper on the question " Is the Squirrel a native Irish species ? " which appeared in the May number, Dr. Scharff rightly says that there can no longer be any reasonable doubt about the Squirrel having been a native of Ireland long before the modern introductions took place.

The historical notes given by Barrett-Hamilton and Hinton in the monograph to which he refers furnish ample evidence on this point, but

they are not equally conclusive with regard to the date of the extinction of the animal in Ireland, if it ever really became extinct.

The authors of the monograph speak of the gap between the end of the fifteenth century when the Squirrel must have been abundant and its reintroduction about 1815, but they overlook the fact that the book of "Rates Outward" scheduled to the Irish Act 14 and 15 Car II., Cap. 9 (1662) indicates that in the second half of the seventeenth century Squirrel skins were being exported by the thousand from Ireland.

This diminishes the gap by half, confirms the statement of O'Flaherty as to the presence of the Squirrel in 1684, and reduces the problem to the question how long it succeeded in surviving the great destruction of woods which took place in Ireland in the seventeenth century.

T. V. Le Fanu.

Abington, Bray.

Hares in the City of Belfast.

Looking out of a window in my school, Richmond Lodge, Malone Road, Belfast, one day in April, to my surprise I saw a hare running along the road between the tram-lines. Surely this is a curious occurrence in a big city like Belfast. Mr. R. J. Welch tells me that hares are often seen on the lawn of Sir William Whitla's house in Lennoxvale, which is not far away, say about a quarter of a mile—nearer the centre of city, and also in the grounds of another house near at hand.

Joan Elsa Loewenthal.

Belfast.

About two years ago a Hare was seen in rather extensive private grounds well within the city boundary of Belfast, inspecting a Rolls Royce motor car, which had just arrived in front of the house. The Hare walked round the car and seemed to inspect it carefully, as something different from what it had ever seen before, stopping and looking at the wheels and other parts. Its inspection occupied several minutes, and suddenly hearing sound of some one approaching, it pricked up its ears and ran down some stone steps to a terrace below.

The owner of the grounds chanced to be looking out of a window in the house when the Hare arrived, and it was the first time he realized that his grounds were a refuge or city sanctuary for such a wild animal. He has often since seen Hares on the lawns in the grounds, with some Squirrels, Hedgehogs, and an occasional Stoat. A pair of Pheasants sometimes nest among the trees, while Herons and other wading birds visit a fairly large pond not far from the house, and quite close to one of the main tram lines of the city.

J. C.

Belfast.

THE ALLEGED ERUPTION OF KNOCKLAYD.

BY PROFESSOR GRENVILLE A. J. COLE, D.SC., F.R.S.

In Vol. xii. of the *Irish Naturalist*, p. 140 (1903), Dr. R. Lloyd Praeger quoted an account of a "Volcano at Knocklade," from the *Morning Post or Dublin Courier*, for June 12, 1788. An eruption is said to have broken out on May 30, and is described with much convincing detail, even to the explosion of an egg that was placed in the hot ashes. McLeod of Coll in the Hebrides and Dr. Hamilton of Portrush are said to have been among the visitors. The whole thing may have been a skit on the Neptunist and Vulcanist controversies of the time. The Rev. Wm. Hamilton of Condevadock had been active on the side of the Vulcanists since 1784.

There is a reference to bogslides in the letter in the *Morning Post*, and it is possible that a slide on Knocklayd, which has a ring of peat-covered land around its crest, may have inspired some ingenious wit. Dr. Praeger informs me that the letter is dated from Ballycastle, and is signed "Pliny, the Younger."

The romantic story has been revived by an unsigned article, under the heading "Personal and incidental," in the *Northern Whig* for May 15, 1922, to which Mr. Nevin H. Foster of Hillsborough has called the attention of naturalists in Dublin. Mr. Foster has made enquiries into the history of the matter in Belfast, and very kindly allows me to put forward his results.

The writer in the *Northern Whig* says that he has "disinterred a letter" from Ballycastle to a gentleman in Dublin, dated May 31, 1788. One would conclude that he had become possessed of the original manuscript; but Dr. Praeger informs me that this letter appears in *Faulkner's Dublin Journal* for May 31, 1788, so that, if it really emanated from Ballycastle, it must have been "dated" a week or so earlier. It begins, "Yesterday we had the most violent storm of thunder and lightning," and then says that in the evening local fears were increased "by a most

uncommon noise from Knockdale," which clearly is a misspelling of Knocklade or Knocklayd, " the top of which burst, and the discharge of burning matter and hot stones from it was truly alarming, killing several cattle in the adjoining fields ; many cabbins were thrown down and several people are missing." The rest of this elaborate story may now be studied in the *Northern Whig.* The contributor says that he was led to look into the matter by a reference in " the poems of Thomas Beggs, the Glenwherry poet." The works of Beggs appear to be rare, and no copy so far has been placed in the National Library of Ireland. Mr. Foster has very kindly copied out the passage referred to. It occurs in a poem of 25 pages, entitled " Rathlin ; a descriptive poem, written after a visit to that island." 2nd edition. Printed by Hugh Clark and Company, Corn Market, Belfast. O'Donoghue's " Poets of Ireland " gives the date of publication as 1820, and that of the birth of Beggs as 1789, a year after the alleged eruption.

The style of Beggs was evidently influenced by that of Scott. He describes how " *Dubh ni Valone,* weird-like Nun," was apt to utter disturbing prophecies, including in her scope :—

" Lands o'erwhelmed with watery peat
From black *Knock-laida's* bursting breast."

At this point he quotes in a footnote an account of the eruption printed in the *Hibernian Gazeteer,* 1789 ; this is given in full in the *Northern Whig,* May 15, 1922. Beggs seems, shrewdly enough, to have toned down the marvel in his own mind to the record of a bog-burst. He adds, " the author gives his authority, but does not vouch for the truth of the preceding article."

The bibliography of the alleged eruption so far extends over thirty years, during which no contradiction of the story has been traced (*Faulkner's Dublin Journal,* May 31, 1788 ; *Morning Post or Dublin Courier,* June 12, 1788 ; *Hibernian Gazeteer,* 1789 ; Thomas Beggs ," Rathlin," 1820). It is specially remarkable that the vivid accounts of the eruption should have been unknown to the Rev. Wm. Hamilton, B.D. The first edition of his " Letters concerning

the northern coast of the County of Antrim " was published in 1786 ; but that usually quoted is dated 1790. On p. 94, he refers to the basalt on the summit of " Knocklade," and here surely would have been his opportunity had his attention been called to any of the three Dublin publications. There seems to be no mention of the story in J. E. Portlock's excellent review of the discussions on the origin of basalt in northern Ireland (" Report on Geology of Londonderry, &c.," 1843). It would now be of interest if some Irish naturalist could supplement Mr. Foster's researches by the discovery of a contemporary criticism of statements so circumstantially set down. Feeling ran high at the time in geological controversy ; the Wernerian orthodoxy was upheld in Dublin by the authority of Richard Kirwan ; and some wit on the Neptunist side may have hoped to stave off defeat by suggesting that a Vulcanist would acclaim the action of " fire " even in the pluvial phenomena of a bogslide.

Royal College of Science, Dublin.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 17.—LAGAN VALLEY.—Some forty members travelled by train to Hillsborough, proceeding thence along the banks of the Lagan Canal to Lisburn. The Sweet Flag—*Acorus Calamus*—was found in profusion almost all the way to Lisburn. *Elatine Hydropiper*, which the late G. H. Davies found abundant at Tullynacross—beside the tenth lock[1]—was not noted, but a tiny local plant like this is easily overlooked. The party on reaching Lisburn proceeded to the Friends' School where they were entertained to tea by Mr. Spencer-Smith (the Headmaster) and his wife, who afterwards conducted the party over the School. The usual business meeting was afterwards held in a class-room, kindly placed at the Club's disposal by the Headmaster, the President (Rev. W. R Megaw, B.A.) in the chair. Ten new members were elected and a vote of thanks to the host and hostess closed the proceedings.

[1] *Irish Nat.*, vii., 259.

JULY 1.—LANGFORD LODGE.—This excursion, conducted by T. E Osborne (Hon. Treas.) was held when forty-six members and friends visited Langford Lodge, twelve of whom were conveyed by motor boat to Ram's Island. Thirty-three members proceeded at 10 a.m. by char-a-banc from the Old Museum to Langford Lodge.

On reaching the little harbour at Langford Lodge, it was found that the motor-boat owners considered it too rough then for the crossing to Ram's Island, so the party dispersed for some hours; the botanists especially taking advantage of the respite. Some, under the leadership of S. A. Bennett, B.Sc., proceeding towards the mouth of the Crumlin River, along the shores of the lough where our native plants grow in the wildest profusion, and though no new records were made in this well-searched area, new stations were noted for some of our more interesting plants. The Dog's Mercury (*Mercurialis perennis*), a rare plant in the North of Ireland, though very common in England was found growing in a flourishing colony—a welcome confirmation of an old record. Other plants seen were the Meadow Rue, *Thalictrum flavum*; Sweetbriar, *Rosa rubiginosa*; Skull-cap, *Scutellaria galericulata*; Cowbane, *Cicuta virosa*. A Wild Duck's nest was noted near this in the wood well away from the lough and high up in a willow tree, and a Pheasant's nest with seven eggs, all of them broken evidently by some vermin, possibly by a rat. Here also the zoologists hunted for mollusca and water beetles along the harbour margin, obtaining many of the latter and ten species of the former, the best of which were the small obese, thick *Limnaea stagnalis* and *L. palustris*, and the very high-spired *Valvata piscinalis* so typical of Lough Neagh and Lough Beg, the last being very fine in the short canal at Toome. One of the conductors pointed out the two great masses of fossil (silicified) wood on the lawns, usually known as Lough Neagh petrified wood—an entirely erroneous term, as the lough has no petrifying qualities whatever. Ram's Island was visited by some of the party, who found the round tower there still in good condition. It is about forty feet high still, and it is advisable that the big gap at the bottom should be at least partly built up. The island is, or was, the habitat of two rare and local plants, *Malva moschata* and *Ranunculus Lingua*. Neither has been seen there since 1875. That most interesting member of a relict fauna, *Mysis relicta*, occurs in shallow water close to Ram's Island, but was not obtained on this visit. The rare landshell, *Zonitoides nitidus*, is abundant on marshy ground.

After tea a business meeting was held, the chair being occupied by the President, Rev. W. R. Megaw, B.A., who requested an honorary member, R. J. Welch, to deliver an address on the special features of the Lough Neagh basin, including the archaeology of Ram's Island. Four new members were elected on the proposal of the Hon. Treasurer.

The President then referred to the kindness of Colonel H. A. Pakenham, D.L., C.M.G., in throwing open his charming grounds to the members. A vote of thanks was passed by acclamation.

A start for home was made at 7 p.m., the return journey being *via* Crumlin, Glenavy, and Lisburn.

BEES AND CLOVERS.

A Day on the Murrough of Wicklow.

BY A. W. STELFOX, M.R.I.A.

On the 29th of May last I spent the day collecting Hymenoptera along the Murrough from Wicklow to Newcastle. Leaving Wicklow station I crossed the railway bridge over the river and turned southwards to visit the classic habitat for the clovers *Trifolium subterraneum* and *T. glomeratum*. The spit between the sea and the river is at this point about a quarter of a mile in width and composed mainly of fine shingle mixed with sand, and rises from three to, perhaps, ten feet above high water mark. Along the river there is an "escarpment" about three to five feet high, which slopes down to high water. This slope is the stronghold of the Clovers, for being annuals they have a better chance here of seeding themselves than in the close sward on the flat behind, a large part of which is used as football grounds. A few hundred yards south of the railway I encountered large patches of *T. subterraneum* made conspicuous at a distance on this date by the small white flowers. *Trifolium striatum, T. filiforme* and *Trigonella ornithopodioides* were also present and all four species continued southwards in abundance, till opposite the old railway station on the spit, where they were joined by a profuse growth of the pretty little pink flowers of *T. glomeratum*. Beyond this point they seem to die out ; but I did not pursue them further. Turning towards the sea I crossed the football grounds which were covered with Trigonella and found a nice patch of *T. glomeratum*, between the playing pitch and the old railway, with *T. striatum*, *T. filiforme*, and Trigonella.

Seaward of the railway, especially at the chemical works, Trigonella and *T. filiforme* completely dominate the sparse vegetation, probably more so this year than usual following the dry summer of 1921, which killed a certain percentage of the perennial plants forming the sward. Turning northwards and again crossing the railway and following the inner side of the spit by the shore of the

tidal Broad Lough, *T. striatum* greeted me at almost every suitable spot, while a little north of the footbridge across the river it is abundant. I assume this spot is Dr. Scully's station for *T. glomeratum*, but neither on this nor on a previous visit with Mr. G. E. C. Maconchy in 1921 could I find this species. *T. scabrum* I only saw on a raised bank a short distance south of Newcastle, between the sea and railway, where it was quite dominant for a few yards.

Discovered, respectively, by A. G. More in 1867 and by Dr. David Moore in 1869, *T. subterraneum* and *T. glomeratum* appear to have been generally regarded as aliens.[1]

At present I could see no reason for such a suggestion as none of the ordinary weeds of cultivation occur with them and the ground is covered with *Scilla verna* ; moreover they are conspicuously absent from the disturbed ground along the railway where the aliens congregate. *Carex Pseudo-cyperus* still lingers in Dr. Moore's station near Newcastle but seems nearly extinct, only a few plants being seen by the road, half a mile west of the station.

Amongst the Bees the beautiful little *Osmia aurulenta* occurred in hundreds between Killoughter and Newcastle along the railway banks. This species I added to the Irish list last year from The Island, Malahide. Amongst other captures was a male Humble Bee (*Bombus lucorum*), the presence of which at such an early date in a late season is surprising and, had it not been in good condition, might have given rise to the question :—" Can a male survive the winter by hibernation " ?

Of the Fossores or Digging Wasps I was glad to find a large Ammophila, almost a giant among our species, being more than an inch in length and across the wings. Freke captured two specimens on the sands at Arklow many years ago, which he recorded in this Journal (vol. v., p. 40) as *A. hirsuta*, but one of his specimens in the National Museum is *A. lutaria*, a closely allied but apparently rarer species in England.

[1] I find I am mistaken. See A. G. More in "Recent Additions," p. 5, 1872, where both plants are stated to be " undoubtedly native." It would appear to have been the editor of *Cybele II.* who first and last regarded them as aliens.

All my specimens from the Murrough, which include both sexes, proved also to be *A. lutaria*. It is, therefore, interesting that of the four English Ammophilas we only know the rarest of them to occur in Ireland. My specimens were all taken between Killoughter and Newcastle, at places where breaks in the sward occurred and low sandy banks faced southwards. Near Killoughter and also close to the Coastguard Station south of Newcastle I captured a new Irish insect, a Plant Bug, *Therapha hyoscyami*, L., a brilliant scarlet and black insect whose distribution in England is given by Saunders as mainly coastal from Wales on the west to Yarmouth on the east. Mr. Halbert kindly named the Therapha for me.

Rathgar, Dublin.

REVIEWS.

IRISH GEOGRAPHY.

The Provinces of Ireland. Edited by G. FLETCHER, F.G.S. ULSTER, 186 pp., 6s. 6d.; LEINSTER, 256 pp., 7s. 6d.; MUNSTER, 176 pp., 6s. 6d.; CONNAUGHT, 171 pp., 6s. 6d. Cambridge University Press, 1922.

The Editor, Mr. George Fletcher, in a preliminary note, tells us that the object of this series is to give an account of the physical features of Ireland and of the economic and social activities of its people. This conforms very closely to the aim of the modern geographer, who seeks above all things to bring about a realisation that Geography is a real, live thing, exercising an almost supreme directing influence upon the development of social and economic life.

That this is being gradually recognised is evidenced by the change that has taken place in the presentation of geographical matter to the student and to the public. No longer are we bored by long lists of meaningless names—always obtainable with greater accuracy and facility from any railway or steamship guide—or by the enumeration of cut-and-dried facts, seldom interesting, often inaccurate, and never clothed with the flesh and blood of living reality.

To-day we seek to know the causes that have given rise to the delicate and intricate social and economic structure of which we form a part. The geographer seeks to discover these causes, believing that physical, geological and climatic conditions are the soils in which have been generated and developed men's thoughts and actions throughout all time. For these reasons we welcome this Series, believing that the more such books are studied, the nearer we are to a true understanding of past events and the more definite will be our dreams for the future and the more practical the methods by which they may be translated into actual fact.

A very welcome and interesting aspect of modern geographical work is that no special system has become stereotyped as the one and only method of approach. In some cases, notably that of the late Professor Herbertson, one writer may cover the whole field of geography from oceanography to racial distinctions. On the other hand, as with Semple's "Influences of Geographic Environment," the author may confine himself to that particular section of geographical research which appeals most to him and which he has made his own. A third method is illustrated by the "International Geography," where Dr. Mill, acting as general editor, produced a work written by 70 authors. This work embraces an account of all the lands of the world, each author having very special knowledge of the "land" described by him.

Mr. Fletcher, in following this last method, has gathered round him a group of distinguished scholars with special knowledge applicable to Ireland on the subjects of ancient geography, topography, archaeology, geology, botany, zoology, antiquities, administration, industries and manufactures; and by devoting a section of each volume to each of these subjects he has compiled a complete whole. The disadvantages of such a method are apparent, but the advantages are also very great, and in this particular case, where a profound knowledge of every aspect of Irish life and conditions is required to lift the work above the common level of a school text-book, it appears to be the only method that could have been successfully adopted.

In one particular the series suffers from the dislocation caused by the Great War. The printing was delayed for several years pending that period of stress, and in consequence some of the information given is not fully up-to-date. Under the circumstances this was unavoidable, and it is only here and there that it makes itself apparent.

Each volume opens with a short chapter on Ancient Geography, written by Professor R. A. Stewart Macalister. This arrangement, is particularly happy in the case of Ireland. The author's reputation is sufficient guarantee for the originality and interest of this section.

Dr. R. Lloyd Praeger is responsible for Topography, Botany and Zoology. As a writer on botany and zoology, Dr. Praeger's name is a household word. In these pages he crystallises into definite statements much that hitherto was but vaguely known. His indications of the relationship between flora and physical conditions is especially interesting and seems to indicate that a wide field of work still remains to be covered in what may be termed "Plant Geography."

'It is not an easy matter to write an interesting description of surface features. Too often it develops into a mere classification of mountain ranges and peaks and lists of rivers and lakes. We therefore congratulate Dr. Praeger on his method of presenting this subject and giving us such a vivid and readable account of the climate, mountains, rivers, lakes, traffic routes and coast lines of each province. The photographic illustrations are well chosen, and the black and white diagrams illustrating relief and traffic control are most effective and provide a valuable aid to a correct understanding of this important subject.

The Geology of Leinster and Connaught is written by Professor Cole, and that of Ulster and Munster by Professor Swain. Professor Cole needs no introduction as a descriptive writer on geological subjects, and we have every reason to congratulate ourselves that he was prevailed upon to contribute to this series. His method of tracing the gradual steps of geological events which ultimately combined to give us our present scenery is picturesque and instructive. There appears to be a large field of research work still to be covered with regard to soils and minerals and this, together with lack of space, no doubt accounts for the somewhat brief notice given to those two subjects. The descriptive geology of Ulster and Munster follows very closely the plan adopted with regard to Leinster and Connaught, and the same remarks apply as to soils and minerals. The illustrations add much charm to these sections.

The value of including chapters on Antiquities in a book on geography cannot be too highly estimated, and this is especially so when the chapters are written with such a wealth of interesting historical detail as Mr. E. C. R. Armstrong is able to give to these subjects. The photographs of the old abbeys, castles and shrines, and of the various high crosses, weapons and jewellery greatly add to the interest of these pages.

We are glad that in addition to doing the editorial work, Mr. Fletcher also found time to write an account of the Administration, Industries and Manufactures. He brings unrivalled knowledge to bear upon these subjects. It is well to note that these volumes were published at the end of 1921, and since that date many changes have taken place in administration and education, and perhaps greater ones are contemplated, so that much that is written, while invaluable as an historical record of splendid work undertaken and accomplished, is no longer a complete account of the conditions prevailing at the moment. A close reading of the summarised account of industries and manufactures will repay the earnest student. He will gain a comprehensive view of our economic life, a knowledge of which should lead to much speculation and thought as to what is best for our future commercial and industrial activities.

Dr. Best has rather a thankless task in writing the account of the distinguished men of each province. It is significant that he opens three of his four chapters with the apology "space does not permit." The reader finishes these pages with a feeling of unsatisfied hunger; he wants more, but the bowl is full to the brim. Therefore we sympathise with Dr. Best, and feel that the inclusion of this section in so limited a form does not add to the strength of the work.

In commending the series to the general reader and to the student, we do so because we feel that a distinct step forward has been made, that a long felt want has been supplied, and that at the present time the issue of such a work is most opportune. These volumes should be on the book-shelves of every library in Ireland. They would soon need replacing. We understand that a fifth and final volume dealing with Ireland as a whole, by the same writers, is in the press.

G. T. Clampett.

NOTES.

BOTANY.

Plants of County Dublin.

In the following notes I have endeavoured to fill up some gaps in Mr. Colgan's "Flora of Dublin," and I have refreshed a few early records :—

Ranunculus trichophyllus Chaix. District 2—Sparingly in a ditch near the windmill, Skerries, 1918. This completes the series for the county.

Ranunculus hirsutus L. 4—Several plants on the railway bank near the 11th lock, Royal Canal, Blanchardstown.

Sisymbrium Thalianum J. Gay. 7—On a roadside wall above Killakee, near the turn to Glencree, at 1,200 ft. *Cybele* (2nd edition) gives "to 1,000 ft. in Antrim" as the greatest elevation for Ireland.

Sisymbrium pannonicum Jacq. 4—Beside the Liffey near the foot of Knockmaroon Hill, and again near the Wren's Nest. 7—Abundant in waste ground in St. James's Gate Brewery.

Senebiera didyma Pers. 2—Near the harbour at Skerries. 4—Abundant as a garden weed at the rectory, Finglas.

Medicago denticulata L. This appears to be a very rare Dublin plant. It is recorded in "Cybele Hibernica" 1866 as having once been found between Dolphin's Barn and Crumlin, but does not appear to have been subsequently seen there. I first noticed this—some dozen plants—in 1918, beside the field-path from Kimmage to Dolphin's Barn, and it appeared again in the same place in 1919 and 1921.

Melilotus parviflora Desf. 7—Same station as above, 1920 to 1922—also at the west end of the large quarry at Mount Argus brickworks.

Trifolium arvense L. 3—Very common on the Burrow, Portrane, 5—Unusually abundant on the North Bull, 1922.

Vicia hirsuta Koch. 2—Abundant on south side of Loughshinny harbour, 1918.

Saxifraga tridactylites L. 3—In sandy fallows at north end of the Island links, Portrane, 1922.

Saxifraga granulata L. 5—In 1919 I found a small patch of about twenty plants, east of Kilbarrack churchyard, from which it was apparently last recorded by Hart in 1866. Unfortunately in 1920 a bungalow was built right on this spot.

Gentiana campestris L. 7—In Glenasmole, in a field on the east side of the Upper Reservoir.

Ornithogalum umbellatum L. 5—Though an obvious garden outcast, has been established and apparently increasing for several years by the cliff path by the Needles, Howth.

Ophrys apifera Huds. This orchis is apparently sufficiently rare for a new station to be welcome. In July 1922 my friend Rev. H. Jennings, rector of Finglas, showed me seven or eight good plants scattered over some hundred yards of broken ground in the disused quarries near that village.

Polypogon monspeliensis Desf. 4—Several plants by roadside at Cabra, near the level crossing to Cardiff's Bridge, 1922.

Poa compressa L. Mr. Stelfox's Rathmines station has survived the concreting process referred to by him in October 1920, and is now flourishing (see also below).

Ceterach officinarum Willd. 8—About a quarter of a mile north of Glencullen crossroads, at 950 feet. Mr. Colgan says of this species "ascends to 600 feet at Ballinascorney."

J. P. Brunker.

Rathmines, Dublin.

County Down Plants.

The following botanical notes may be of interest. Last week I gathered *Erisymum cheiranthoides* (easily distinguished by the trifid hairs on the leaves) in the grounds here. As the plant was growing near the chicken-run it was no doubt introduced with corn seed. I see by the new supplement to the "Flora of the N.E." (in proof) *E. cheiranthoides* has not been reported from Co. Down before, and only once from Co. Antrim. In a field at Portnacoe, Co. Down, I found *Orobanche minor* growing in considerable quantity on the White Clover with which the field was sown; and near Donegore Church, Co. Antrim, *Chenopodium Bonus-Henricus*.

Corrie D. Chase.

Campbell College, Belfast.

Poa compressa survives!

In spite of the treatment meted out to this plant in 1920 (see *Irish Nat.*, vol. xxix., p. 108), a small tuft of it was seen by Miss Knowles on the wall in Grosvenor Place, Rathmines, last year. This year it has almost recovered its former luxuriance, but there is now only one clump visible instead of several.

A. W. Stelfox.

Rathgar.

ZOOLOGY.

Felted Beech Coccus in Ireland.

In the Board of Agriculture and Fisheries (England) leaflet No. 140 the Felted Beech Coccus, *Cryptococcus fagi*, is stated to have been recorded from only one locality in Ireland (not given). Some five years ago I first noticed this insect on the beech boles at Ballynafeigh, Belfast. Since then it seems to have spread rapidly and now occurs throughout this district. Recently I have found it extensively in North Down.

Museum, Belfast. J. A. Sidney Stendall.

Egg of Fulmar Petrel—an Irish Example.

What I believe to be the first Irish-taken egg of the Fulmar reached me in June, from Rathlin Island. The specimen is smaller than the average, only measuring 60.5 mm., but being broken and having lost some of its contents, I was of course unable to determine its weight. Further the egg was infertile which is of interest when considering the remarks made by Mr. E. W. Wade in the July *Naturalist* (England), p. 223. Mr. Wade comments on the breeding of the Fulmar on the Yorkshire cliffs—a new breeding habitat—which he remarks "is a matter for congratulation to the naturalists of Yorkshire, but there is nothing surprising in the event." The author has made a study of the Fulmar at St. Kilda and found "about 25 per cent. of the eggs examined on the *outlying stacks* to be addled, as if the birds were getting old and past laying further eggs." Presumably the eggs laid in the main colony are those of prime birds and the inference is that the birds on the stacks have been crushed out by the younger and stronger generation. Our only evidence in Ireland as to the breeding powers of the bird seems to be from the egg now in my possession which gives a direct negative on account of its infertility. It seems probable that Irish examples of the species are also outcasts and possibly very few young are reared on our cliffs.

Museum, Belfast. J. A. Sidney Stendall.

NEWS GLEANINGS.

The greatly increased membership of the Belfast Naturalists' Field Club during the Session 1921-1922 and two months over—fourteen months in all—is evidence of the fact that societies like our Irish Field Clubs, strictly non-sectarian and non-political, can continue their activities in the cause of Irish science and their hobbies in natural history in spite of the general unrest and political situation. The B.N.F.C. has added one hundred and eighty new members to its list in the fourteen months ending May last; of these the Hon. Treasurer (T. E. Osborne, F.R.S.A.I.) obtained one hundred and fifty-eight, and has added many others since. Surely this is a record for a Naturalists' Field Club in the British Islands. Many English clubs have less for a total membership.

ERNEST W. L. HOLT.

ERNEST W. L. HOLT.

By the death in London on June 10th of Mr. E. W. L. Holt, Chief Inspector of Irish Fisheries, Irish Marine Zoology has lost not only one of its ablest and most versatile investigators, but also an efficient supporter, for though his interests were mainly centered in the institution of which he became the head and with which he was for so long associated, he was always ready to aid any researches which seemed likely to yield useful results.

Ernest William Lyons Holt was born in London on the 17th October, 1864. He was educated at Eton, where he gained the Biological Prize, and, entering the army through Sandhurst, was gazetted to the Duke of Cornwall's Light Infantry. He served through the Nile campaign of 1884-5 and afterwards in the Burmese War of 1886-7, during which his health broke down and he was invalided home. After leaving the army he took up the study of zoology in 1888, and while acting as assistant to the Professor of Zoology at St. Andrews he commenced those researches in ichthyology which afterwards became his chief interest.

Holt first came into touch with Irish zoology in 1890, when he was appointed assistant-naturalist to the Survey of the Fishing Grounds of the West Coast of Ireland, organised by the Royal Dublin Society, and carried out on board the steamer " Fingal," replaced in 1891 by the " Harlequin." The general report on the Survey was entirely his own work, and he subsequently published valuable papers on the eggs and larval stages of fishes taken during the Survey, and also, in collaboration with W. L. Calderwood, on the rarer fishes, chiefly deep sea forms taken during an extension of the cruise into the deep water of the Atlantic.

After the completion of the Survey, Holt joined the staff of the Marine Biological Association, having been appointed to take charge of a laboratory which was opened at Grimsby for the purpose of studying the fishery problems of the North Sea. Here he continued his fishery investigations, applying scientific methods to the solution of practical problems of economic importance, and helping

to lay the foundations of those enquiries which in time resulted in the founding of the International Council for the Study of the Sea. Leaving Grimsby in 1894, he worked for some time at the Station Zoologique d'Endoume at Marseilles, where he published a comprehensive and finely illustrated paper on the larval development of Mediterranean fishes. He then returned to England and spent three years at the Plymouth Marine Laboratory, where in addition to ichthyology he took up the study of various groups of invertebrates.

In 1898, when the first Irish marine laboratory was started by the Royal Dublin Society, Holt returned to Ireland to take charge of it, and when in 1900 the Department of Agriculture and Technical Instruction for Ireland was founded and the marine laboratory, then at Ballynakill, Co. Galway, was transferred to its care, he was appointed Scientific Adviser to the Fisheries Branch of the Department, becoming subsequently, in 1908, Inspector of Fisheries and, on the retirement of the Rev. W. S. Green in 1914, Chief Inspector.

As soon as he joined the Fisheries Branch of the Department, Holt devoted all his energies to the furtherance of fishing investigation on a scientific basis, and to bringing Irish investigations into line with the most recent British and European work. When the International Council for the Study of the Sea was founded, he successfully pressed the claim of Ireland to play her part in the work then being organised, and again, when Dr. Schmidt commenced his memorable researches into the life-history of the freshwater eel, Holt came to his aid and, as Schmidt has recorded, was able more than any other to forward his work.

Most of the results of Holt's personal studies after coming to Ireland will be found in the *Scientific Investigations* of the Fisheries Branch, a series of reports which consist in the earlier years very largely of his own work, and in which the share contributed by his colleagues was mainly the result of his inspiration and instigation. He early devoted his attention to the improvement of methods of Salmon hatching and rearing in Ireland, and was instrumental in starting a number of new hatcheries. He also set on foot

the systematic marking of Salmon under the superintendence of the Department, a line of enquiry which, in his hands, has yielded valuable information as to the life-history of the fish. The experimental breeding and fattening of oysters also engaged a good deal of his time, with somewhat disappointing results. These experiments were started at Burren, Co. Clare, and continued at Ardfry, Co. Galway, for a number of years.

During the last few years the pressure of administrative duties, coupled with failing health, did not, as he used to regret, allow him much time for personal research, but his wonderful memory for detail enabled him to keep in touch with any investigations which were in progress under his direction, and to forward them with suggestions and plans. One of the last of his activities was the organization of the Limnological Laboratory on the Shannon at Portumna, near Lough Derg, for the study of lacustrine biology and its influence on fish life. In addition to his other attainments he was a competent archaeologist, and for some years acted as editor of the *Journal* of the Galway Archaeological and Historical Society, to which he contributed several papers. He found his recreation, in the short intervals which he spared from his official work, in life out of doors, chiefly in shooting and fishing, and he was also an enthusiastic gardener.

Holt's wide general knowledge of marine zoology was remarkable. He was familiar with all the common forms in almost every group of invertebrates and had made a special study of the Schizopoda, while his knowledge of British Fishes in all their aspects was probably unsurpassed. Endowed with a critical mind and a nature intolerant of anything tinged with insincerity or self-seeking, Holt concealed beneath an impassive manner and a mordant wit a capacity for real friendship, and for attracting the affectionate regard of others, and never spared himself trouble or thought on behalf of those who were glad to reckon themselves amongst his friends.

G. P. Farran.

BOTANICAL NOTES FROM S.E. WEXFORD.

BY A. W. STELFOX, M.R.I.A.

In July last I spent a few days in Co. Wexford with the intention of collecting Hymenoptera, but the weather was so unpropitious, dull, cold and stormy, that my attentions not unnaturally wandered towards the vegetable kingdom. Staying at Rosslare the dunes there naturally absorbed a good deal of my time. The golf links is certainly a sporting one, *Juncus acutus* acting as an excellent "bunker," while the sward of the "greens" consists to a very large extent of *Erodium maritimum*. The fringe of dunes between the links and sea, is richly decorated with *Pastinaca sativa*, the Common Parsnip, and at one spot I found a great colony of a pretty little Evening Primrose, which was very fragrant towards dusk. Miss Knowles has identified this as *Oenothera odorata* Jacq., a South American species (Chili, Patogonia, &c.) which has occasionally been found as an alien in Great Britain.

I failed to find *Trifolium glomeratum* recorded by the late E. S. Marshall as abundant in two sandy fields "near Rosslare House"; but *Trigonella ornithopodioides* seemed common. *Orchis pyramidalis* is thinly scattered over the dunes, but *O. ericetorum* and *O. incarnata* are confined to the damper hollows where *Salix repens* grows.

A short visit to the marshes west of Rosslare for Orchids yielded only *O. incarnata* and *O. Fuchsii*.

I spent a day at Carnsore Point and the south-eastern corner of Lady's Island Lake and of course went to see *Diotis candidissima* on the shingle between the lake and the sea. At the present time there is nearly an acre of it about a quarter of a mile west of the old outlet of the lake. East of this now filled up channel I found a Dodder (*Cuscuta* sp.) not then in flower. It grew profusely in one place on *Lotus corniculatus* and *Galium verum*; more sparingly in another spot on *Thymus Serpyllum*. This plant—assuming it to be *C. Epithymum*—always seems to me to be native. If an alien why is it not of more frequent appearance amongst crops, like *Orobanche minor*, and why does it seem to prefer coastal districts where local and unquestionably native plants are usually to be found?

Below Barnawheel I saw *Trifolium striatum*; three plants on the bank between the cultivated lands and the sandhills. *Erodium maritimum, E. moschatum, Trigonella ornithopodioides* and *Calystegia Soldanella* were common near the last locality.

North of Carnsore Point the Samphire is wonderfully luxuriant along the beach, but I saw no other plant worth mentioning. Turning inland by the road north of Nethertown—towards Castletown—I had a great piece of luck. In the north bank of the road, just before it joined the main road down the "peninsula," I found *Asplenium lanceolatum* in some quantity but very shrivelled by the drought. Only the fact that a few years ago Mr. R. A. Phillips gave me a plant of this fern, from his Co. Carlow station, prevented my passing it by. The bank upon which it grew was built up of granite boulders and sandy soil and faced due south. Possibly I may have overlooked it previously, as I have a recollection of seeing what I took to be *A. Adiantum-nigrum* nearer to Nethertown, or between that place and Carnsore Point along the coast. Until Mr. Phillips's discovery of it in Co. Carlow it was known as Irish only from Cork and Kerry; but as it is well known in south-western England its occurrence in Wexford is not surprising. In the marsh south of Ring near Lady's Island Lake I had hoped to find some interesting plants but was disappointed. The only thing of interest here was a curious form of the sedge *Carex vulgaris* simulating the rare *C. trinervis* in habit, having very long bracts and stout agglomerated female spikelets. It grew with normal *C. vulgaris* and what I took to be var. *juncella*; but its dark glumes and flat leaves at once separate it from a plant of *C. trinervis* which I owe to the kindness of Mr. C. E. Salmon. In Lady's Island Lake I saw *Ruppia rostellata, Ranunculus* sp., and a curious little Chara which grew in a few inches of water and looked just like little submerged clumps of *Lycopodium selago*. Miss Knowles ran it down for me as *Chara aspera* var. *subinermis* and Canon Bullock-Webster has confirmed her diagnosis. High and dry along the shore were patches of *Littorella lacustris*, looking very quaint with the long anthers fluttering in the breeze.

Along the seaward end of the lake I noticed Silver-

weed (*Potentilla anserina*) sprouting in the sand under a foot of water, its underground stems having travelled under the lake and then grown upwards. It seemed curious to see such a reversal of habitats, on the same day, within a few hundred yards space :—Potentilla growing in the lake and Littorella well above the water level. In this district I saw also some curious plant associations. For instance a little north of Nethertown behind a fringe of blown sand I came across a bank between fields, the maritime end of which was occupied very largely by *Carex arenaria*, while the landward end was entirely occupied by Honeysuckle, two plants that one does not naturally associate with each other. On my way home I stopped at the head of the lake to visit *Rumex maritimus* ; it was just in flower and had not yet turned golden.

On the last morning of my trip I went past Ballycronigan House to the coast, 1½ miles south of Greenore Point, and worked northwards to the old church of St. Helen's. Here *Salvia Verbenaca* was abundant, looking more native than about Rosslare ; while *Convolvulus arvensis* had very deeply coloured rose and white flowers. Approaching St. Helen's I picked up a withered clover that looked like *T. scabrum*, and subsequently *T. striatum*, while on reaching the old church I found all the little rocky knolls round about it covered with a sward composed mainly of these two species. *Trifolium striatum* has been recorded from the spot (Rev. E. S. Marshall), but *T. scabrum* appears to be new to this part of Wexford.

About Kilrane I noted the ditches were full of *Carex remota* and *C. divulsa*, neither of which I saw elsewhere, with *C. vulpina*, but a hurried search failed to produce any hybrids. South of Rosslare where the road turns inland to Tagoat, the Bee Orchis grew profusely in stiff Boulder-clay along the cliff-tops and in the adjoining grazing fields. I have, as usual, to thank Miss M. C. Knowles for verifying my identifications in the field, particularly of *Asplenium lanceolatum* and *Erodium moschatum*; also for identifying the Chara and Oenothera which were unknown to me.

National Museum, Dublin.

REVIEW.

THE BRITISH ASSOCIATION.

The British Association for the Advancement of Science.—A Retrospect. 1831-1921. By O. J. R. Howarth, O.B.E., M.A., Secretary (London: British Association, Burlington House. 1922). Pp. viii.+318. Price, *7s. 6d.*

The remark of a Dublin alderman that Ireland had good scientific men and need not extend a welcome to the British Association showed, not only his insularity, but a misapprehension of the word "British," as covering what appertains to a geographical entity, the British Isles. Mr. Howarth's timely volume makes it clear that the Association is not an English or a Scotch body extending its favours to an adjacent colony, but that it was built up from the first on principles of equality and fraternity. Its fifth meeting was held in Dublin (1835), under the presidency of Bartholomew Lloyd, Provost of Trinity College, and President of the Royal Irish Academy from 1835 to 1837; Cork was visited in 1843, when another Irishman, the Earl of Rosse, was President; and in 1852 Sir Edward Sabine, who was at any rate born in Dublin, presided over a meeting in Belfast. From Mr. Howarth's useful Appendix II. we can easily quote the other Irish meetings:—1857, Dublin; 1874, Belfast, with John Tyndall, a farmer's son from the County of Carlow, as an electrifying President; 1878, Dublin; 1902, Belfast; 1908, Dublin. The astronomer, Thomas Romney Robinson, then rector of Carrickmacross, presided at Birmingham in 1849; George Gabriel Stokes, son of the rector of Skreen, in the County of Sligo, at Exeter in 1869; Sir William Thomson [Lord Kelvin] at Edinburgh in 1871; Thomas Andrews of Belfast at Glasgow in 1876; and Sir Charles A. Parsons at Bournemouth in 1919. We thus trace at least nine Irishmen as presidents of the "British" Association.

For the commonwealth of scientific workers no such list is needed. The Association provides, as its founders hoped, a meeting-ground for all who are interested in the outcome of research. It is important to learn that the revival of a federal spirit in Germany at the close of the Napoleonic tyranny promoted the formation of a Deutscher Naturforscher Versammlung in 1822, under the inspiration of the naturalist-philosopher, Larenz Oken (*né* Ockenfuss); our debt to the German model is here happily pointed out. The portraits of the founders and early leaders of the British Association would alone assure a welcome to the work. We have the kindly honest face of John Phillips, who taught in Dublin University in later years; Murchison, with his favourite air of a commanding officer in the Peninsular war—his active service ended as an ensign at Coruña; Tyndall, evidently under Carlylean influences; and the splendid head of Huxley as many of us knew him in the "eighties." Likewise Adam Sedgwick, who baptized the sea-captain's baby between Liverpool and Dublin (p. 32) when coming to the meeting of 1835;

Whewell wondering if all was going well with Miller's "Treatise on Crystallography"; and the gentle Kelvin, writing a good word for a student whom he treated as a colleague in research. The Association performed its greatest function when it brought men in outlying towns, men already enthusiastic in promoting their local societies, into contact with leaders such as these. Visits to Montreal in 1884, Toronto in 1897, South Africa in 1905, Winnipeg in 1909, and Australia in 1914, spread in the self-satisfied centre of our commonwealth a knowledge of developments overseas. Members may have felt that they had much to learn about river-erosion at Niagara, the tribal ceremonies of Zulus in Natal, or the proteacean flora in New South Wales; but they actually learnt more from watching a railhead being pushed westward through the forest, from a glimpse of two red-coated riders keeping the British peace upon "the Plains," or from sitting at the same table, looking out on the Zambesi, with the quiet courteous commissioners who held the scales of justice between native and settler in Rhodesia.

Mr. Howarth, in telling us of the more memorable discussions at the meetings of the Association, traces, under subject-headings, the history of scientific investigation in recent times. The people who call the Association the "B.A.," as if the letters had no other signification, and who attend meetings regularly for the sake of gossiping about them afterwards, probably grow fewer year by year. Thanks to the work done, however grudgingly, in our schools, a knowledge of the real purport of experiment and research is far more common than it was even twenty years ago. The excellent volume before us shows how the British Association kept hope alive in times when education was less liberal, and also how it has contributed largely, by grants from its funds and by the co-operation of members of committees, to the maintenance of natural knowledge and the promotion of discovery in new fields. Its meetings are not the place for the reading of small papers that may be suitable for scientific journals, but have no width of outlook or appeal. The tendency at present seems to be a happy development of broad discussions, often inter-sectional, and the exhibition to local workers, depressed at times by isolation, of the hosts that are really on their side. In Hull, Dundee, or shall we say Dublin, the eyes of the young man are opened, and he sees the mountain of scientific achievements full of horses and chariots of fire.

GRENVILLE A. J. COLE

THE HABITS OF THE LONG-EARED BAT.

BY C. B. MOFFAT, B.A., M.R.I.A.

THE habits of so familiar an animal as the Long-eared Bat (*Plecotus auritus*) ought by this time, one would think, to be too thoroughly known to need much further study; and I confess that I was a little disconcerted on learning in the summer of 1913 (towards the end of August) that a swarm of bats of this species was to be seen every night clustered together on the ceiling of a dark passage at Ballyhyland. I was in Dublin at the time, and could not personally investigate the matter; but having always regarded the Long-eared Bat as an all-night flier I felt my impressions rather badly knocked on the head by the intelligence that a multitude of these animals spent the early hours of every night clustering on the wall or ceiling of a dark indoor passage—where, moreover, they were never seen in the day-time.

The account given me was, however, perfectly correct, and the bats in question continued to frequent the passage in the same manner for at least seven years (1913 to 1919 inclusive)—except during the winter months, when they went elsewhere for hibernation. During the last five years of this period I had them under almost daily—if I may use such a word when I mean nightly—observation; and I now feel that I owe to the readers of the *Irish Naturalist* some qualification of the verdict, "All-Night Flier," which Dr. Alcock and I (as Tomes had done before us) returned on the Long-eared Bat in the article we contributed to this Journal[1] in December, 1901.

The inference that the Long-eared Bat flies all night was drawn by Tomes (Bell's "British Quadrupeds," 2nd ed., p. 75) from the fact that he was accustomed to hear its cry in the open fields at all hours of the night, and even in the darkest nights. To this Dr. Alcock and I were

[1] Vol. x., pp. 241-251.

able to add the further fact that we had seen and identified it on the wing, hunting moths, on the stroke of midnight and at 1.30 a.m. Such observations suffice, I think, to show that there is no hour of the night at which Long-eared Bats are not flying and taking prey. To that extent the habits of this species differ radically from those of the Hairy-armed Bat (*Nyctalus Leisleri*), which retires at the close of the evening twilight to the same sleeping apartment in which it has passed the day, and remains there until the approach of morning, when another brief flight is taken. However, it is one thing to fly at all hours of the night, and another thing to fly continuously throughout the night, as the Pipistrelle or Common Bat (*Pipistrellus pipistrellus*) seems to me to do, except during those brief intervals of rest which are necessitated by its capture of some insect too large to be comfortably disposed of during flight. From my five summers' observations on the Long-eared Bats in the passage at Ballyhyland, I am now convinced that each individual bat of that species spends a very considerable part of the night at rest—the rests varying in duration from half-an-hour to several hours, and the length of the period of flight being about equally elastic.

The hours during which the bats were to be seen on the walls of the passage in question varied according to the time of year, and, in some degree, to the state of the weather, the phases of the moon, and other causes too complicated to ascertain. In spring, when the nights were still fairly long, the assemblage would often have reached its largest dimensions by nine or ten in the evening, and have completely dispersed before twelve. In June and July the largest gatherings were generally seen about midnight, or perhaps an hour later. In August the bats again assembled early and broke up before midnight; but later on—especially after October set in—when the nights grew cold for insect hunting, it was not unusual for the bats to come in early and remain in their cluster the greater part of the night. I did not, however, ascertain at what o'clock on these chilly autumnal mornings they broke up and disappeared. The passage was never used as a sleeping place by day.

The presence of this assemblage in so convenient a spot as the passage leading from the main corridor to my bedroom was a great help towards ascertaining the periods of hibernation and activity, and also some particulars as to the breeding habits of these bats. They generally began to show themselves in the passage in some numbers before the end of March, and continued to do so well into November. In the four springs from 1916 to 1919 the earliest dates for seeing clusters of three or more were respectively March 30, March 24, March 19, and April 4. The latest dates in the four autumns from 1915 to 1918 were November 9, November 24, November 22, and November 24. Individual bats turned up in the passage in every winter month; but this was a very occasional occurrence, and I never saw two together on any night between the beginning of December and the end of February.

A fact of some importance ascertained by watching these bats was that their principal mating season is the spring—from the first week of April till about the middle of May.

This fact, of which it was easy to obtain convincing evidence on almost any evening of the period indicated, is not in agreement with the conclusion arrived at for bats in general by the two continental zoologists—Messrs. R. Rollinat and E. L. Trouessart—whose memoir[1] is pronounced by Major Barrett-Hamilton the most complete treatise bearing on the breeding habits of these mammals. These high authorities—for whose conclusions I am indebted to the summary of their memoir in Barrett-Hamilton's "History of British Mammals"[2]—find that the pairing of bats is almost exclusively an autumnal function, and that though occasional acts of mating take place in winter during intervals of interrupted hibernation, there is never any pairing in spring.

---

[1] "Sur la réproduction des Chauves-Souris." *Mém. Soc. Zool. de France*, ix., pp. 214-240, 1896.

[2] Vol. i., pp. 32-4.

These results, however, appear to have been arrived at by the actual study of only three species—the Mouse-coloured (*Vespertilio murinus*) and the Greater and Lesser Horse-shoe Bats (*Rhinolophus ferrum-equinum* and *R. hipposideros*)—of which only the last-named is found in Ireland. As regards those bats that are familiar to British observers, the absence of spring coupling is strongly doubted by several of our best authorities, as, for instance, by Mr. Arthur Whitaker, who thinks that the manner in which Pipistrelles chase one another in spring is only consistent with amorous propensities,[1] and by Mr. T. W. Proger, who draws similar conclusions from the conduct of the Lesser Horse-shoe Bat as observed by him in Wales.[2] Major Barrett-Hamilton's conclusion is that the matter deserves further study, and that the verdict of MM. Rollinat and Trouessart, "in view of the condition of the male, is so surprising as to seem in need of corroboration."

Be the facts as they may regarding the Pipistrelle and the Lesser Horse-shoe, the conduct of the Long-eared Bats in the passage at Ballyhyland left no room for doubt that in the case of that species coupling takes place systematically and on a large scale when the bats come in to rest of a spring night. It was not unusual to see three or four cases of pairing simultaneously in progress within the distance of little more than a yard along the passage wall. By pretty careful watching I ascertained that autumnal coupling also occurs, but only on quite a small scale ; and the repetition of the procedure in four consecutive years made it clear beyond question that spring is, in that locality, the chief mating season of the species. The time when pairing seemed to be at its height varied from about April 18th (in 1917) to about May 3rd (in 1916). The earliest and latest dates at which it was seen in spring were April 5th and May 28th ; in autumn, October 16th and November 29th. This last date would doubtless be an instance of coupling during interrupted hibernation.

---

[1] *Naturalist*, 1905, pp. 325-330.

[2] *Proc. Cardiff Nat. Soc.*, March, 1905.

That the winter sleep of the Long-eared Bat is frequently interrupted has been proved by many observers, and particulars of one individual's repeated changes of residence during the winter months were given by Dr. Alcock and myself in the article already referred to.[1] I therefore think it well to give here an instance to the contrary, which one of the bats of the congregation now under notice was good enough to offer me in the winter of 1918-9. It very kindly chose for its place of hibernation a corner of the same passage that had formed the nocturnal resting-place of the crowd in summer. I thus had it in full view every day and night from the beginning to the end of its occupancy. During the first fortnight of December, being still only in the incipient stage of its hibernation, it used to fly for short periods (sometimes two or three hours) on warm evenings ; but from December 15th to March 26th it never once moved, although there were several nights when the temperature in the open was as high as 48°, and one (December 28th) when it stood at 50°. This bat, therefore, enjoyed an uninterrupted winter-sleep of 101 days.

During summer, as might be expected, the floor of the passage was strewn with large numbers of wings of the various moths on which the bats had been feeding. A list of these would not add much to our knowledge of the Long-eared Bat's taste in edibles. I was indebted, however, to the animals for the welcome information that the Copper Underwing Moth (*Amphipyra pyramidea*)—not hitherto, so far as I know, recorded for Co. Wexford—occurs at Ballyhyland, since its wings were dropped on several occasions. Other interesting moths brought in were the Peach-blossom (*Thyatira batis*) and its congener *T. derasa*, the Burnished Brass (*Plusia chrysitis*), the Tiger Moth (*Arctia caia*), whose brilliant colours do not appear to possess a warning value, and the Shark Moth (*Cucullia umbratica*), which interested me from the fact that the bats seemed never to bring it in in the earlier half of the night, as I frequently searched the floor after midnight without ever finding this species,

---

[1] *Irish Nat.* vol. x., pp. 245-7.

though its wings were of frequent occurrence in the mornings. Wings of the Silver Y (*Plusia gamma*) and its relative *P. pulchrina* were sometimes scattered in such abundance as to outnumber all the other kinds ; but this was only when the rhododendrons round the house were in flower, and as the flowers of these shrubs were much frequented by both the Plusias during and after dusk I have little doubt that the bats hunted among the blossoms and caught the moths at rest drinking nectar.

As another mark of the Long-eared Bat's predilection for taking insects at rest I may mention the conspicuous absence under their bivouac of the wings of the well-known Ghost-Moth (*Hepialus humuli*). That this moth is a favourite prey of some very common bat is proved by the large numbers of its wings that are commonly found on roads ; but as it is much more easily found on the wing than at rest we can understand its falling a readier prey to those bats that chiefly hunt flying insects than to those that, like the Long-eared Bat, seek for sedentary victims.

The extremely common White Ermine Moth (*Spilosoma menthastri*), which is disliked but not invariably rejected by bats, was so rarely carried into the house by my long-eared friends that during my five summers' observations I only once found its wings on the passage-floor. Of decidedly more frequent occurrence were those of the Buff Ermine (*S. lubricipeda*), which I found every year, though this is undoubtedly much the less numerous species in the district. The less conspicuous colours of the Buff Ermine would, I think, suggest that its flavour is probably somewhat less unpalatable than that of *S. menthastri*, and the treatment of both species by the Long-eared Bats would seem to point to the same conclusion ; though Mr. Oldham's important observations on the feeding habits of the Noctule[1] have made it perfectly clear that some degree of unpalatability is possessed by both these moths.

---

[1] Zoologist, 1901, pp. 51-9.

It is a little remarkable that Mr. O. V. Aplin (who seems to have studied the Long-eared Bat's feeding habits in a similar nocturnal retreat to that frequented at Ballyhyland, though he regarded it simply as a "dining-hall" of the animals) also includes the Buff Ermine, without mentioning the White, among the moths whose wings were dropped by the diners.[1] The White Ermine is, however, to my knowledge sometimes eaten in large numbers by bats whose species I have failed to ascertain, and who are probably less fastidious than the Long-eared kind.

The only non-lepidopterous insect whose wings I found on the passage floor was the large spotted crane-fly *Tipula gigantea*, which was also noticed by Mr. Aplin as preyed on by his bats in Oxfordshire. Very small wings would, in any case, escape notice, and many such are certainly crunched up and swallowed with their possessors.

Before closing I should state that when hours are mentioned in this paper I have not followed any of the changes that have been made in our statutory time since the summer of 1915. "Summer Time" (introduced in 1916) was, of course, never intended to be followed in scientific notes; and the change from Irish to Greenwich time, coming later, would, if followed, introduce further complications into a comparison between notes taken before and notes taken after the change. I prefer, therefore, in all records of natural history observations in which hours have to be mentioned, to adhere to old Irish time, and use the term "12 o'clock" (instead of 1.25 a.m.) for the true middle of a summer night.

Dublin.

[1] *Zool.*, 1889, p. 382.

IRISH ENCHYTRAEIDS IN THE FAROES.

Light on the Question of Distribution.

BY REV. HILDERIC FRIEND.

In August I received from the Faroe Islands a small sample of the peaty soil taken from the side of a stream about two miles inland from Thorshaven. To the naked eye it appeared to be entirely wanting in living organisms, but by careful and patient examination with a pocket lens I was able eventually to discover about a dozen specimens of microscopic enchytraeids, belonging to four different species and genera, as well as a beautiful little nematode.

Three of the worms are already known to occur in Ireland, while one of them has, up till the present time, been recorded from no other habitat, and is therefore of peculiar interest to the student of the Irish fauna and the distribution of its members.

The Enchytraeids are frequently spoken of as white-worms because of their colourless blood, but two genera at least possess blood which is coloured. These red forms are conveniently known as Pachydrilids, the others as pot-worms—the English translation of the scientific name—or white worms. The facts here recorded may be compared with what is known of the distribution of other Irish Annelids or Oligochaets, such as *Lumbricus papillosus* Friend, or *Eisenia veneta* Rosa, with its interesting varieties *hibernica* Friend, and *zebra* Michaelsen.

1. *Lumbricillus lineatus* (O. F. and C.). This is not recorded by Southern as Irish under this name, but W. Thompson[1] gives *Lumbricus lineatus* Muller for the coast of Down. Prof. Carpenter informs me that the specimens were named by Dr. George Johnston, author of "A Catalogue of British Worms in the British Museum," 1865. The localities noted were attached to the specimens. I have already pointed out in this Journal (2) that every intermediate stage between *L. verrucosus* and *L. lineatus*

[1] "Natural History of Ireland," vol. iv, p. 428.

may be detected in samples from one locality ; and Welch, who is the foremost American authority, has more than once confirmed my conclusions. See his papers for 1917 and 1919 in the appended Bibliography. The synonymy is in part given by Michaelsen (4), but in the light of recent research this must be amended, and the list of habitats (p. 80) made to include England, Ireland, Scotland, Faroe Islands and Canada.

2. *Marimina* (*Chamaedrilus*) *sphagnetorum* Vejd. An interesting note on this species is given by Southern (5). I have elsewhere given my reasons for transferring this species to the genus Chamaedrilus on account of the number of septal glands, the free spermathecae, the shape and size of the coelomic corpuscles, the colourless blood, the position of the sexual organs and other peculiarities. I have found it rarely in England, though its related form is abundant. We now add the Faroe Islands to the other known habitats.

3. *Achaeta minima* Southern.—Described in 1907 (5) from a specimen found in soil from Lambay. " A minute, transparent worm, 3 mm. long. Number of segments 22." By an error we read that " the brain is about 12 times as long as broad." I take it to mean $1\frac{1}{2}$ times, or twice as long as broad, as was the case in the specimen found in the Faroes. My specimen agreed in every particular with Southern's, except that it was about 1 mm. in length, surely the smallest soil-worm on record. Its present known distribution therefore is Lambay and the Faroes. This discovery lends interest to the remaining species, which has not yet been found in Ireland, but is certain to occur.

4. *Mesenchytraeus oligosetosus* Friend.—This worm reached me from Jersey in June, 1913, where it was collected by Mr. H. Hillman. Length about 6 mm. Segments 35.

It belongs to the group which exhibit enlarged setae in the neighbourhood of the spermathecae, and was described by me in the *Zoologist* (1). I found an allied form, or possibly the same species with marked differences, near Birmingham more recently. The Faroese specimens agreed in every detail with those found in Jersey Known distribution Jersey (Elmdon, Warwickshire), Faroe Islands.

The nematode was a fertile female *Dorylaimus obtusicaudatus* Bastian.

Peaty soil has usually been regarded as unproductive. It would be interesting if samples from different Irish localities could be examined. Material sent to me in tin boxes without holes would receive careful attention.

Solihull, Birmingham.

Bibliography.

1. Friend. Some Jersey Oligochaets. *Zoologist*, 1913, 456-464.

2. Friend. Notes on Irish Oligochaets. *Irish Naturalist*, xxv., 1916, 22-27.

3. Johnston. Catalogue of British Worms. 1865. *L. lineatus* (*salnuris*) 66 reff.

4. Michaelsen. Oligochaeta (Das Tierreich), 1900. Especially p. 80.

5. Southern. Oligochaeta of Lambay. *Irish Naturalist*, xvi., 1907, 68-82. (*Achaeta minima* first described, p. 77).

6. Southern. Contributions towards a Monograph of British and Irish Oligochaeta. *Proc. R. Irish Acad.*, vol. xxvii., 1909.

7. Welch. The Enchytraeidae of the Woods Hole Region. *Trans. Amer. Micro. Soc.*, xxxvi., 1917, 119-138. (*L. lineatus* (Müll.), identity. p. 123 seq.).

8. Welch. Oligochaeta collected by the Canadian Arctic Exped. 1913-18., 1919. (*Lumbricillus lineatus* (Müll.), p. 15 seq. "*L. lineatus* is apparently cosmopolitan," p. 18).

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Yellow Baboon and a Green Monkey from Dr. E. Bate, a pair of Marmosets from Mr. R. Bates, two Foxes from Mr. C. Healy, a North African Jackal from Mr. E. M. Hoy, an Indian Mongoose from Mr. Knowles, Badgers from Messrs. E. Rotherham and J. Malone, four Irish Stoats from Mrs. Higginbotham, a Hedgehog from Mr. C. H. Bretherton, Rabbits from Mrs, Collan, Mrs. Godfrey, Mrs. Thorogood, Mr. R. D. Fayle and Dr. Rowlette, Cavies from Mrs. Godfrey, a Black Rat from Mr. C. H. Bretherton, a pair of Peafowl from Major Gracie, three Goldfinches from Mr. W. W. Despard, a Mynah from Dr. R. R. Leeper, a Barn Owl from Mr. J. Sheils, an Amazon Parrot from Miss Donell, a Pennant's Parrakeet from Miss Preston, a Sulphur-crested Cockatoo fron Capt. French, a Royal Python from Dr. E. Bate, Grass Snakes, Dice Snakes, Green Lizards, Tortoises, Alpine Newts, Green Frogs and Toads from Prof. A. F. Dixon, Thunder Fish from Mr. B. T. Child, Nine-spined Sticklebacks, Rudd, Carp and Minnows from Mr. C. H. Bretherton, Loach from Mr. G. P. Moore, Spotted Slugs (Geomalacus) from Mr. C. Green, and Stick Insects from Dr. R. R. Leeper.

A Lion Marmoset, a Bison, two Lion Cubs (parents "Sean" and "Nuala"), a Woodward's Kangaroo and a Black-striped Wallaby have been born in the gardens. Two young Lions (wild-bred) have been received in exchange.

Recent purchases include a group of Rhesus Monkeys, a Cherry-crowned Mangabey, a pair of Mandrills, a pair of Indian Mongooses, four grey Squirrels, a Hornbill, two Green-billed Toucans, two hen Pheasants, a pair of Pelicans, and two male Somali Ostriches, four Tortoises, eight Geckos, and a dozen Axolotl.

The attention of visitors may be especially called to the Aquarium, where, in addition to a good collection of freshwater fish, are now on view the great Royal Python (12ft. long) and other handsome reptiles, besides a highly interesting series of tanks containing water-insects and other examples of "pond life." The group of Bison, the young Kangaroos, and the baby Lion Marmoset are also of exceptional interest.

NOTES.

Rare Birds in Ulster.

We have received a copy of some interesting notes by Mr. Alfred Sheals, of Belfast, under the above title, reprinted from the columns of the *Northern Whig*. The list contains details of the occurrence in Ulster of many notable species, including the American Black-billed Cuckoo, Scops Owl, Sea-Eagle, Osprey, American Bittern, Glossy Ibis, and Pallas Sand-grouse.

Mr. Stelfox and Cybele II.

In the August number of the *Irish Naturalist*, Mr. Stelfox states (p. 90) that *Trifolium subterraneum* and *T. glomeratum* appear to have been generally regarded as aliens. In a footnote on the same page, he corrects this statement as regards Mr. A. G. More who in "Recent Additions," 1872, recorded both plants as "undoubted natives"; in the same note Mr. Stelfox then proceeds to accuse the "editor"—there were two of them—of Cybele II. of being the "first and last" so to regard them. May I ask Mr. Stelfox where these plants have been treated as aliens in Cybele II.?

On pp. 83 and 86 of that work, these two clovers will be found with a † prefixed, and on p. lxxii. in the Introduction the † is explained as indicating "a slight suspicion of having been introduced by the agency of man"; an * being used for those "certainly introduced."

In 1898 when Cybele II. was published, the late Mr. Colgan and I were quite agreed that both these plants should have the sign †, and in 1922, as regards *T. subterraneum*, I am still of the same opinion.

REGINALD W. SCULLY.

Dundrum.

REVIEW.

A MUSEUM HANDBOOK.

The Horniman Museum: A Handbook to the Collections illustrating a Survey of the Animal Kingdom. By H. N. MILLIGAN. Second Edition. Pp. 66. London County Council, 1922. Price 6*d.*

Three pages on some elements of morphology are followed by an account of the Animal Kingdom in 61 pages, under fourteen phyla, from Protozoa to Chordata. The Echinodermata are placed between Mollusca and Arthropoda, which is scarcely a "conservative" position. Surely such arguments as there are would lead one to place them next the Chordata. The statements are as accurate as can be expected in an account that must combine brevity with intelligibility and has small room for the qualifications demanded by meticulous precision. For example, the theory of the origin of Echinoderms from bilateral [non-echinodermal] ancestors through fixed forms postulates that "the mouth was directed [at first downwards and then moved] upwards." Mr. Milligan's omission of the words in square brackets conveys a wrong impression. Since the Echinoderms are allotted a page more than either Molluscs or Arthropods, they might, perhaps, receive more careful statement. Two pages at the end of the book suggest how the beginner may proceed with the study of zoology.

BIRDS' SONG.

BY J. P. BURKITT.

THIS paper is a further study in continuation of two previous articles.[1] These studies of the seasonal course of the song of some species and of many individuals, may or may not produce anything of value or even of interest; but as hardly anyone is likely to take the pains, even if he had the opportunity, to make almost daily notes throughout the whole season, involving subsequently a laborious abstracting of the notes, I feel the results had better be recorded. Others may be able to make use of them or to make comparisons. Individual members of a species vary no doubt in song characteristics, but that taken on the whole they follow a wonderfully similar course seems more clear the more they are studied. Any generalisation about a species herein may be taken to represent as faithfully as I can the great majority of its members. For example I try to avoid such traps as that of a few strong singers giving the erroneous impression that the song is general.

The theories put into my mind from the result of observation run as follows through the season. I have mentioned them less coherently before. However far they may be true, at any rate they afford a point of view to connect the seasonal observations on various species.

1. Mating generally puts a brake or stopper on song.
2. Hence a declension of song for first nests and broods.
3. But song is carried on more or less by un-mated birds.
4. After the first brood there is a recrudescence of song.
5. The later song lasts in the season the later the breeding lasts.
6. There may be (*a*) no breeding, or (*b*) not much, after the second song, especially in Ireland where such song ends sooner. In case (*a*) I called it *residual* song (*supra*, p. 121).

[1] *Irish Nat.*, vol. xxx, 1921, pp. 1–10 and 113–124.

7. The later song in any of the brood periods will be due to unmated males, as in (3).

Autumn song in my district is practically nil ; in England it is considerable. Should we compare it with residual song or is it, as I have seen suggested, the real beginning of the spring song ?

I had found it comparatively easy to study our less abundant but good singing species, such as warblers. Paragraph (1) and (2) above generally applied to them, and Mr. Howard (" Territory in Bird Life ") incidentally implies that it applies to a number of warblers which we have not got in Ireland. But I had left for my more recent studies Thrushes, Blackbirds, Chaffinches, Wrens, Robins, Hedge-Sparrows. The Wrens and Robins are puzzlers, as they sing nearly all the year round. I am not prepared to say much more about them, (see below). The Hedge-sparrows are not great singers here, and I have not given them enough individual attention to be able to say anything about relation of song to nesting, but I give other notes below. The others—Chaffinch, Blackbird, Song-Thrush, are abundant and prominent and come within the purview and interest of the ordinary person. We may add the Missel Thrush. I gave my season's record for them last year, and herein I give the record for this year. Each record is a faithful abstract of each year's notes, but the resulting parallel is to me astonishing. I am not going to weary the reader by detailing the similarities.

In dealing with Thrushes' and Blackbirds' song, observations would lose most of their value, if they did not include the song at the dusk of morning and evening. Thus to the ordinary sleepy human being the former is mainly a blank. I shall abbreviate by using d.d.m. and d.d.e. for dark dusk of morning and evening respectively. And d.e. means not so late as d.d.e. Where I use the expression " day song " I mean song excluding the dusk song and mainly between say 9 a.m. and 5 p.m. (summer time).

An important point of view in considering Thrushes, Chaffinches and Blackbirds is that much day song points to an unmated bird ; though the May Blackbirds are doubtful.

ROBIN.—The Robins round me appear to keep each to its territory all the year round, and from year to year. I am familiar with over eight such permanent territories, inside which each bird nests and outside which it is never seen to trespass. They commonly sing against each other. Each territory is about one-third of an acre, or equivalent to a circle forty-five yards in diameter. We connect territory with song, so would not this give one good reason why a Robin sings all the year ? I think the Wrens are similar.

SONG THRUSH.—From the beginning of the year 1922 Thrushes could be heard, especially on the less wintry days, and generally before 10 a.m. Towards the end of January the number increased, while judging by the sites the earlier ones may have ceased. The song then ranged to perhaps an hour later in the morning, with a rare one in the evening (not at dusk). Throughout February the Thrushes from being morning or early day singers, gradually changed to being evening dusk singers, so that by the end of February practically all song was at d.d.e. and lasted only for a few minutes. In general there was practically no day song in March. There was none in the case of known *pairs*. Of course there were exceptions to day silence in March. These seem special cases explicable as due to birds which find it difficult to get a mate, such as by being in an unsuitable nesting territory. I heard Thrushes on the edges of streets and in railway yards with well marked singing perches from some of which there was day song from March 2nd to possibly April 30th. Also *if* song is prolonged by the absence of a mate, the very severe weather in February might have reasonably retarded mating and prolonged song. But I repeat that these were quite the exception. D.d.e. song went on through March and through the season but always lasting for only a minute or two, nothing like the d.d.m. song.

D.d.m. song seemed to begin with March and soon all Thrushes took part in it and it increased in duration till the end of March, when it lasted fifteen minutes or so. I shall describe this song to the end of the season. The new Thrushes (arrivals ?) which began with April seemed to join in it, so that towards end of April there was a fine

chorus which even appeared to include those dealing with, or done with, first clutch. By the first week in May d.d.m. song lessened and probably consisted only of the newer birds, but did not altogether cease till the second week in June.

In the first week in April we had new Thrushes (*i.e.* at new sites and presumably arrivals) singing as those in January and early February, before breakfast and at evening. They increased through April. The d.d.e. song continued, but seemed to be due mostly if not entirely to new birds. At mid-April there arose a late evening or a sunset song with a gap between them, and before the d.d.e. song. This routine was not regular till the end of April.

I have mentioned elsewhere that the known nesters' song in decadence seems to change from day song, first to evening and then to a few minutes at dark dusk. The above tendency towards evening may be due to the new birds following the same course.

By the end of April the Thrushes were evidently getting in each other's way (territory). In the beginning of May this year new arrivals seemed still coming and seemed to be the cause of our still having some *day* song at any except the middle hours of the day.

Any day singers there were got fewer towards the end of May.

Towards the end of May and beginning of June d.e. and evening singers dwindled, the former first. By June 7th there was none of the former. By June 15th there were rare Thrushes in late afternoon or evening. I this year heard a very occasional Thrush in the country decidedly later than usual, and I knew of broods also later than usual. A bird began singing near me on July 3rd and continued on and off for a week, ending with a few bars at dusk. I heard none anywhere after July 10th.

As to actual nesting pairs, I dealt particularly with seven round me. Five had their first egg about April 1st. Two had it earlier, back to March 10th. In all these cases day song had ceased five to seven weeks before the first egg. That is to say all song had ceased except at the two dusks.

BLACKBIRD.—Evidence of pairing began with February, and after the first week of February a good many seemed paired. Whether paired or not territory could be defined by presence and by perching up ; but there was yet no song. Many birds were in territory and paired a fortnight before song began anywhere, which this year was not till the fourth week of February. The normal first egg was in first or second week of April. What song there was in all the period before eggs was erratic, occasional, and very feeble and began by a few minutes at roosting time (d.d.e.) with a tendency in any singer after about the middle of March to also have a song earlier in the evening and to last longer. A very occasional bird might be heard in ordinary day time.

Where a male has long delay in being mated the song is more regular, more prominent and longer. For example, I had one which sang for five weeks before there was sign of a mate.

With regard to the subsequent course of d.d.e. song, all birds seemed to be joining in it after the middle of March, but at the end of March this song went off, with a very rare exception, and never recurred. (This is a curious feature which arises from my notes, if correct. I did not consider it at the time. My last year's notes partly corroborate it).

As to song at d.d.m. it seemed to begin in first week of March and was not general till after the middle of March, but was not at its height in volume and period this year till the second week in April (incubation was then commencing) ; it then continued regularly and was apparently joined in by all Blackbirds till the end of May, going off as June began and not ending till all song ended.

Throughout April, day song became freer, but was never voluble till near the middle of May. It then remained, this year (1922), the leading feature in the day's song till it began to go off in the first week in June. I heard no song at all after June 9th. Apart from general observation in the country I dealt with six nests round me. Four of them had the first egg between April 7th and 10th, one on the 2nd, one on the 20th.

On considering individual cases for two seasons along with the general effect, the evidence seems to be that Blackbird's song is not as a rule a concomitant in acquiring territory or getting a mate, for normal April broods. Whatever pre-egg song there is, is poor as described above. Day song will probably improve at the time of egg-laying or hatching out, but may not reach its best till about the time young are out of the nest. At this time some courting may be seen, but second broods are uncommon unless there has been some disaster to the previous one (the second clutch being laid up probably not later than May 20th) ; so that in this country any relation between May song and second broods would be potential, not actual.

I do not see any indication of an immigration of Blackbirds here. I see no definite increase in the number of singing sites or territories—so very different from the case of the Thrushes.

Among the Blackbirds round my house there are two examples of strong individuality in song, the bird of one territory singing prominently above others, the bird of another territory hardly ever singing the whole season. The same characteristic has persisted these two years in the same two territories.

CHAFFINCH.—I was not so intimate with the Chaffinches this year as I had done them very thoroughly before. Apart from general observation in the country, I dealt with seven nests particularly and a couple of others near me. Six had the first egg close to April 22nd. These were normal broods. Three varied from a fortnight to a month later.

The first song this year was February 8th, by February 12th it was fairly general. But I thought Chaffinch's song this year very poor all through the season. Territories could not be defined with certainty (by song) till the beginning of March. Courting was seen strong at the end of February. By the end of March the better or the only singers were those not clearly mated (nests were then beginning). This was more pronounced in the beginning of April when the mated birds hardly ever sang,

while the unmated ones sang prominently and continued to do so. I had then four unmated singers, which decreased gradually to one by May 18th. The last bird had started late (March 28th) to sing in a certain site, and remained singing and apparently mateless till May 18th.

From May 18th onwards new singers were noted ; these were apparently the mates of just fledged normal broods, which were re-starting to sing in the same territory. I particularly marked one male singing over the nest about a day after the young had left it. I had previously thought that these birds did not re-start till the young had been longer out of the nest ; probably most do not. The maximum of this new song was about June 8th when it was very prominent, but yet not so striking to me as in other years.

By June 13th this song was going off, and the last I heard was June 22nd.

The hours of song agreed with last year's record except that the sunset song there referred to did not seem at all so pronounced. Nor could I say of the late May-June song that it was absent at sunset. I did not study the Chaffinches quite so carefully as last year.

MISSEL-THRUSH.—Song began at end of January. Pairs could be seen at beginning of February. Song was mostly off before the middle of February, and I noticed none in the country this year after February 22nd, except one peculiar and wonderful bird beside me which sang apparently mateless from February 13th to April 17th almost every day and all day. I found a nest being built near this bird some days later. Thus normal early nesters ceased song six weeks before eggs.

HEDGE-SPARROW.—Several years' observation gives the following. First song in the first or second week of February. Normal early clutches laid up in the second half of April. Song weak after March, practically none in May, a strong recrudescence of song early in June. Song ends in first week of July. (The song is sometimes given on alarm).

YELLOW-HAMMER.—I have dealt with this bird before (*supra*, vol. xxx., p. 9). Several years' observation gives the following. First song generally near end of February. Normal early clutches laid up in second week of May. Practically no song in May except from unmated birds. A recrudescence early in June. Much song in the rest of June and July and does not end till the middle of August.

To return to my theories (p. 117). As to (1) and (2) I have already referred to them above and in previous articles. I shall not labour as to how far they are supported by my notes herein. The Blackbirds are evidently a difficulty. I have also dealt previously with (3) and given many examples. No. (4) will be noticed to emerge clearly from my notes in regard to Chaffinch, Yellow-Hammer, Hedge-Sparrow, Greenfinch, Whitethroat, Sedge Warbler, Grasshopper Warbler, Willow-Wren, Skylark (?) and perhaps Blackbird. I cannot be clear how far it applies, if at all, to Song Thrush. Its case seems complicated by immigrants.

As an example of No. 5, Greenfinches, Yellow-Hammers and Ring-Doves are our latest in breeding here as they are in singing. The regular song period with a number of common species lasts much later in England than here, and they also evidently have more broods than here. So that our song towards its termination seems to be in connection with a potential brood which never comes off. I cannot speak for English *nests* except roughly from books ; but the Song-Thrush, Missel-Thrush, and Blackbird appear to continue broods fully a month later than here, and the Hedge-Sparrow and Chaffinch a fortnight later. This corresponds with what observers in the south half of England show me about *song*, namely, that the regular song of Blackbird, Hedge-Sparrow, Song-Thrush (and Greenfinch) continues at least a month later, and also I think the Missel-Thrush. And the Chaffinch sings, perhaps, a fortnight later. (As to beginning earlier, the Song-Thrush, Missel-Thrush, Blackbird, and Hedge-Sparrow appear by the books to begin broods earlier in England by about three weeks).

I conclude with a few queries.

Does song imply, as all the above might suggest, a propensity to breed? I could wish it were something more beautiful. Or is it that breeding merely reduces or quenches song activity for the time being? Assuming that song implies a propensity to breed, what is the rationale of song being at special times of the day as recorded above, especially noting the song at the two dusks, or its absence? How late in the season do these two songs continue in England?

What about song when in flocks such as that of the Redwing and of some Starling flocks in autumn? (I forget whether the Redwing sings before the new year).

Some Starlings sing when in flocks here after the middle of September, and also at roosting sites. These Starling flocks seem to a certain extent to be collections of pairs, judging by the way the birds fly off, just as is the case with Jackdaws, though the latter's pairing is much more pronounced. Might it be the non-paired ones which sing? Most of my autumn Starling song comes from single birds on chimneys. The song and chattering and tendency to pair from flocks in autumn seems comparable to what happens at the noisy spring pairing assemblies of Black-headed Gulls. The Redwings may be acting similarly under a mating impulse, though they must keep together till they leave this country.

Since writing the above a correspondent from Surrey, Miss G. M. Towsey, mentions a Thrush which appears to have sung (for two years) in every month from November to July, inclusive. In last May, June and July it had no really silent period all through the rearing of two and probably three broods. In these months it had three particularly brilliant bursts, one at least of which continued from beginning of nest to half through incubation. My correspondent has little or no doubt that this bird was the parent and thus it would upset all my experience of earlier broods.

Enniskillen.

SOME NEW AND RARE IRISH SPIDERS.

BY DENIS R. PACK-BERESFORD, M.R.I.A.

SINCE the publication in the *Irish Naturalist* of my last list of new and rare Irish Spiders, in April, 1920, I have only one new to the Irish list to record, but that is of special interest as being new to science. I sent it to the late Rev. O. P. Cambridge shortly after taking it, but he did not publish his description of it till three years later, when it escaped my notice, and hence the delay in recording it in the *Irish Naturalist.* The species is *Maso persimilis* Cb. and further particulars are given below. The other species now recorded have all been taken previously in Ireland, but at most in two or three localities, so that these further finds are of interest. I have to thank Mr. R. A. Phillips and Mr. H. B. Cott for collections they have made for me in various localities, from which many of the following records have been taken.

Maso persimilis O. P. Cambridge.

LEINSTER.

In December, 1909, I sent a very minute but very distinct female spider, taken at Fenagh, Co. Carlow, to Mr. Cambridge, which at the time he was unable to indentify and which he afterwards described as a new species under the above name. His description and figures were published in the *Proceedings* of the Dorset Natural History and Antiquarian Field Club, vol. xxxiii., pp. 77 and 91, 1912. Mr Cambridge was rather doubtful whether to place this spider in the genus Maso or in the closely allied genus Gongylidiellum, Simon.

Hahnia helveola E. Sim.

ULSTER.

Amongst a lot of spiders collected by the late Mr. J. R. Milne, in the County Londonderry, which had been in the National Museum for some years awaiting identification, I found a single female of this species, which had previously only been found in Co. Dublin, at Howth and Malahide. These finds I recorded in the *Irish Naturalist* in vol. xxix., p. 30.

Hahnia nava Bl.

CONNAUGHT.

I recorded the first occurrences of this species in the *Irish Naturalist,* vol. xx., p. 194, from Ireland's Eye and Co. Cavan. Mr. R. A. Phillips has now sent me two females from Spanish Point, Co. Clare, taken by himself in February, 1921.

Areoncus crassiceps West.

CONNAUGHT.

I took four females in July, 1920, on Yellow Island in Lough Ree, the only previous records being from Ballysodare, Co. Sligo, Drumlane, Co. Cavan, and near Kilrea in Co. Antrim.

Diplocephalus Beckii Cambr.

LEINSTER.

This species was first recorded as Irish in my Supplementary List of Irish spiders from some specimens that Professor Carpenter had received from Belfast from Mr. H. L. Orr. Since then Mr. Herbert took a single female in Sligo and I have myself taken a single female on the Hill of Howth and another in Co. Antrim, near Kilrea, on the banks of the river Bann. Mr. H. B. Cott has also sent me a single male from the Curragh, Co. Kildare. It is a very rare spider both in England and on the Continent.

Diplocephalus picinus Bl.

ULSTER. MUNSTER.

A single female taken on the shores of Lough Erne, Co. Fermanagh, in July, 1909, and another at Mount Congreve, Co. Waterford, in May, 1920, are the second and third records of this spider in Ireland, the first having been taken at Fenagh, Co. Carlow, and recorded in my Supplementary List (*Proc. R. I. Academy*, March, 1909).

Lophomma subaequale West.

MUNSTER. CONNAUGHT.

Professor Carpenter in his "List of Irish Spiders" records a single male of this very rare species from Terenure, Co Dublin, in 1894. Since that time I found two males on Clare Island, and a single female at Two Mile Borris, Co Tipperary, and another at Fenagh, Co. Carlow, in 1909. I have also lately received another female taken by Mr. H. B. Cott on The Curragh in March, 1922.

Oedothoraz apicatus Bl.

LEINSTER.

This spider has not yet occurred outside the province of Leinster. I recorded a single male from Fenagh, Co. Carlow, in my Supplementary List of Irish Spiders, 1909. Since then I have taken several more males and females in the same locality, and also a female both at Howth and Arklow, in 1913. Mr. H. B. Cott has also sent me a pair lately from The Curragh, Co. Kildare, taken in March, 1922.

Centromerus expertus Cambr.

MUNSTER.

Mr. R. A. Phillips sent me a single female of this rare spider taken by him at Borrisokane, Co. Tipperary, in April, 1921. This is only its second occurrence in Ireland, a male having been found in Co. Armagh in 1892, and recorded by Professor Carpenter in his List of the Spiders of Ireland.

Hilaira uncata Cambr.

LEINSTER. CONNAUGHT. ULSTER.

I took a single male of this species at Fenagh, Co. Carlow, in April, 1921. This is the first male to be taken in Ireland of this rare spider, though females have been found. Professor Carpenter only records a single female from Co. Armagh, and I took two females on the Bog of Griff and one on Clare Island in 1911. Mr. R. Welch sent me three, taken on the Ulster Canal, Co. Monaghan, in 1909, and Mr. N. H. Foster, one from Glenade, Co. Leitrim, in 1914.

Porrhomma errans Bl.

LEINSTER.

My brother, Mr. R. T. Pack-Beresford, has sent me a single female of this very distinct little spider, taken by him at Athlone, Co. Westmeath, in March, 1922. This is only the second locality for it in Ireland. I have taken many specimens of the female at Fenagh, Co. Carlow, but have never yet come across a male.

Pirata latitans Bl

MUNSTER.

I took a single female of this species at Mount Congreve, Co. Waterford, in May, 1920. The only place at which it has been found previously was at Fenagh, Co. Carlow, where two adult females were taken in July, 1907, and recorded in my Supplementary list of the Spiders of Ireland.

Euophrys erraticus Walck.

ULSTER.

The late Mr. J. R. Milne collected a male and two females of this species in Co. Londonderry some years ago, but they only quite lately came into my hands for identification. The only previous record of this spider in Ireland, is that given in Professor Carpenter's List, from Inishmore (Aran), in Galway Bay.

In July, 1920, I spent the afternoon on Yellow Island, one of the very small islands in the south part of Lough Ree, and think the following census of my captures may be of interest. One species—*Areoncus crassiceps* West—already referred to is decidedly rare, and two others—*Dictyna arundinacea* L. and *Oedothorax agreste* Bl.—are not at all common.

Drassus lapidosus, var. cupreus, Walck. (3 females).

Clubiona terrestris, West. (1 male, many females).

Dictyna arundinacea, L. (2 females).

Areoncus crassiceps, West. (4 females).

Oedothorax agreste, Bl. (2 pairs).

Erigone dentipalpis, West. (female)

Erigone atra, Bl. (female).
Pachygnatha Clerckii Sund. (female).
Tetragnatha Solandrii, Scop. (3 males).
Lycosa ruricola, de Geer. (2 females).
Pardosa amentata, Cl. (3 males, 2 females).
Pirata piraticus, Cl. (2 females).

Baily, Co. Dublin.

NOTES.

ZOOLOGY.

The Breeding of the Roseate Tern in Ireland.

In June of this year I was fortunate enough to discover a large colony of Roseate Terns (*Sterna Dougilli*) breeding on an island off the Irish coast. I reckoned the numbers to be between 100 and 150 pairs, which were nesting along with about 20 pairs of the Sandwich Tern and a few of the common species. So far as I am aware, only two other colonies of this rare Tern are known to exist in Ireland, one of which I have visited. This Tern seldom lays more than one egg, and it is characteristic of the bird that, where possible, it will conceal its "nest" under over-arching stems of bent or grass, a habit which I have not observed in any other members of this family.

C. V. STONEY.

Raphoe.

The Breeding of the Fulmar Petrel in Ireland.

Having seen in the *Irish Naturalist* of last month a statement by Mr. Stendall that he had received from Rathlin Island what he believed to be the first Irish-taken egg of the Fulmar (*Fulmarus glacialis*) it may be of interest to learn that as long ago as May, 1911, I discovered this bird breeding on the stags of Broadhaven, and obtained an egg there. I announced the fact to the late R. J. Ussher. In the same year Fulmars bred at Horn Head, Co. Donegal, for the first time, though they had frequented the cliffs of that place for at least two years previously. There are now some 30 pairs breeding at Horn Head, as well as on some of the larger islands of the Donegal coast, and they have extended their breeding range to the South-Western coast and islands of Ireland. It is interesting to notice that within recent years several species, such as the Eider Duck, Red-necked Phalarope and Fulmar, whose breeding stations are in the Far North, have come to make their Summer home in our island

C. V. STONEY.

Raphoe.

In the August number of the *Irish Naturalist* Mr. Stendall says he believes he has received the first Irish-taken egg of the Fulmar Petrel.

Mr. Stendall should look up the previous vols. of *Irish Naturalist*, vols. xxiii. and xxiv. especially. In 1910 Mr. C. V. Stoney, Raphoe, found the Fulmar nesting on Horn Head and procured eggs. Mr. R. J. Ussher first records the Fulmar as an Irish breeding bird in *Irish Naturalist*, August, 1911, but gives Mr. Stoney the credit of being the first to detect them nesting in Donegal in 1910, Mr. Ussher discovering the colony independently in 1911 when with a German Naturalist he found colonies in Mayo; eggs were taken from the Stags of Broadhaven. The Fulmar first settled on the great Skellig Rock, Co. Kerry, in 1913, ten or eleven pairs nesting that season. They had been about the Rock for several previous seasons. In 1914 there were about seventy birds seen, and upwards of one hundred in 1915; these separated into three colonies in following year. Fulmars were seen by Professor Patten about the Tearaght Rock in 1916.

M. J. Delap.

Valentia Island, Co. Kerry.

BOTANY.

Littorella lacustris in Co. Dublin.

During the past summer the water in the upper reservoir in Glenasmole has been continuously low, exposing large areas of sand and mud. It will be seen in Colgan's Flora of Dublin (under *Peplis Portula*, p. 81) that the author visited this spot under similar conditions in 1901. In the early part of August last, seedlings of *Peplis Portula*, as well as those of *Veronica scutellata* and plants of *Lythrum Salicaria* covered most of the dryer ground, while aquatic plants occupied the still damp or water filled hollows. Whilst traversing this ground in search of bees, I noted a few large rich green patches on the sand banks along the western edge of the Dodder channel, which on investigation proved to be Littorella just going out of flower. *Littorella lacustris* is one of the common Irish plants which were unknown to Colgan to occur in Dublin when his Flora was published (see *loc. cit.*, p. xli), and he pointed out that there was really no natural habitat in the county for this and plants of similar habits. The old record for Howth in the Irish Flora Colgan regarded as erroneous.

One cannot suppose that Colgan passed over Littorella in Glenasmole in 1901, and must assume that it has recently become established there. The nearest station, in Co. Wicklow, is probably Lough Bray, about 4¼ miles distant as the crow flies. The seeds of the plant have been wind-blown or bird-carried from some such habitat, or could Littorella be living in the Dodder above the reservoir? Has any botanist ever seen it in pools or along the edge of such a mountain stream?

Not realising at the time the importance of the discovery I did not pay close attention to the water plants, amongst which were Ranunculus, Potamogeton, Callitriche, etc., but it is quite possible that further additions to the Flora might be made if this place was examined carefully.

Rathgar, Dublin. A. W. Stelfox.

Eucalyptus globulus in County Wicklow.

In the early part of September while walking from Wicklow to Rathnew, when near the latter village, my sister drew my attention to an unusual tree growing between a cottage and the road. The tree stood between 30 and 40 feet in height, and the diameter of the bole was 8 to 10 inches. We learned from the owner that the tree, which proves to be *Eucalyptus globulus* Labill, carrying fairly abundant fruit, had been planted by his brother some ten years before, and, although many gentlemen of the district had endeavoured to strike cuttings, none had succeeded. The demand for the fruit as a charm for wearing round the neck showed that a good number of people believed in the preventive powers of the oil. We noticed another example of the same species in the Abbey grounds at Wicklow, but this example was not so fine, nor did we observe any fruit. It is stated in the "Encyclopaedia Britannica," 9th Ed., that the genus will not endure a temperature of less than 27°. Yet the peasant told us that sometimes there are black frosts in Wicklow which did no noticeable harm to the tree. I am indebted to Professor Henry for the identification of the species.

Rock Ferry, Cheshire. Wm. A. Lee.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

July 22.—Mourne Mountains.—Thirty members took part. The party, under the conductorship of the ex-President (S. A. Bennett) and R. Bell travelled from Belfast by char-a-banc.

Crossing the Shimna River at Trassey Bridge, the route lay as far as the Hare's Gap over a rough glacial moraine.

By the courtesy of the Belfast Water Commissioners, and with the permission of Colonel Wickham, Divisional Inspector of the Special Constabulary, the Commissioners' lands in the Mourne Mountains were entered just above the Hare's Gap, and a further climb of 300 feet brought the party to the Diamond Rocks.

At the Diamond Rocks on the Southern slope of Slieve-na-Glogh, 300 feet higher than the *Col*, fine specimens of the characteristic minerals of the Mourne granite were pointed out by Mr. Bell, and specimens of smoky quartz, felspar and mica with a few topaz and the still rarer beryl were collected.

The botanists of the party noted the starry Saxifrage, *Saxifraga stellaris L.*, and on the cliffs, above the Diamond Rocks, good colonies of the Dwarf Juniper, *Juniperus nana L.*

The Trassey Bridge was left at 5.30 p.m.; tea was served at Newcastle Station; the usual business meeting was held, Samual Gibson, J.P. in the chair. Eight new members were elected. The return journey was made via Dundrum, Downpatrick and Saintfield.

August 5.—Castle Dobbs.—A party of thirty-one, conducted by S. M. Macoun went by 2.15 train to Ballycarry Station, visiting first the old church of Templecorran, thence proceeding to Dolway's Bawn, a place of much interest to the antiquary. Mr. A. E. Dobbs having kindly granted permission, way was taken through Castle Dobbs demesne, some members inspecting the ruins of the old castle, others botanizing in the glen.

Out in one of Mr. Lockart's fields, many flint implements of a very early type were found. Some found much resemble some Palaeolithic forms, and what Mr. W. J. Knowles, M.R.I.A., calls the older series of Larne types. One senior and two new junior members were elected.

September 2.—Magheramorne.—A party of 37 members visited Magheramorne quarries and cement works by kind permission of the British Portland Cement Manufacturers, Ltd., and under the conductorship of R. Bell, who gave a brief description of the chief features of the local geology, making special reference to some fresh sections which were being then exposed owing to an extension of the quarry. Beneath the blue clay lies what is apparently a section of thinly-bedded altered Chalk, lying upon a stratum of red earth, this in turn resting on the ordinary Chalk of the district. This section came in for a large amount of examination, as it presented some puzzling features. This section is to be further examined on a future occasion.

Among the fossils noted during the day the following may be mentioned :—Three large *Ammonites gollevillensis*, with diameter of some 15 inches ; *Pleurotoma perspectiva*, *Rhynconella robusta* and *R. octoplicata*, *Pecten quinquecostatus*, *Spondylus spinosus*, *Ananchytes ovatus*, and a shark's tooth, *Lamna appendiculata*.

After tea and a short business meeting, at which six new members were elected, the party was conducted through the cement works by Mr. W. I. Boyd, one of the courteous staff of the Cement Company. Here the various processes connected with cement manufacture were clearly explained, and gave the visitors a just idea of the great importance of this industry to the North of Ireland.

September 16.—Lissanoure.—A party of thirty-three journeyed to Lissanoure Castle, Loughguile, under the conductorship of Dr. T. M. Deans Captain Macartney kindly granted permission to visit the Castle and grounds. The old castle was first visited, and a short address was given by Dr. Deans on its history.

After the castle had been visited the party broke up into sections and visited the several places of interest, including the old graveyard and remains of the church, the heronry on an island (formerly a crannog) in one of the lakes, a plantation grown by Captain Macartney on the German plan, and the modern church of Loughguile. Dr. Wallace Lavin conducted a section of the party, and gave interesting accounts of several places visited. A short business meeting was held, the president (Rev. W. R. Megaw, B.A.) in the chair. Eight new members were elected, and hearty votes of thanks were passed to Captain and Mrs. Macartney.

THE WOLF IN IRELAND.

BY R. F. SCHARFF.

THAT the Wolf once lived in Ireland must be known to every reader of this magazine. The past history of Ireland is full of episodes in which the Wolf plays a prominent part. And yet in spite of this fact we are strangely ignorant of the habits and even of the precise species of this formidable Irish carnivore. Was it identical with the Wolf still living in France? Why was it so abundant in Ireland? Was it indigenous to this country, and how did it reach Ireland? These are some of the questions that as yet have received no satisfactory answer. In any case, as the subject has never been dealt with in the pages of this magazine, I venture to publish a few notes which may elucidate some of the doubtful points in the life history of the Irish Wolf.

The oldest Irish Wolf remains occur in the caves. Associated with the bones and teeth of Reindeer, Mammoth and Irish Elk, certain remains of a large dog-like carnivore have been found. These could not be distinguished from the bones and teeth of the Irish Wolf-hound, but Prof. Leith Adams was of opinion that they belonged to the Wolf. For it is generally believed that the Wolf-hound did not exist as a wild species, but originated at a much later period as the result of selection and domestication by man. The Irish Wolf was first identified by Leith Adams in Shandon and Ballinamintra Caves in the County Waterford.[1] In more recent years I showed that both teeth and bones of the Wolf occur in the Kesh caves, County Sligo, and in Castlepook Cave in County Cork. I also pointed out that although the bones of the Wolf and Wolf-dog are indistinguishable, the molar teeth of the former are decidedly larger than those of the Wolf-dog. They are even larger than the molar teeth of the modern European Wolf as far as I could ascertain.

[1] A. Leith Adams: Report on the Exploration of Shandon Cave, *Trans. R. Irish Acad.*, Vol. xxvi., 1876. Exploration in the Bone Cave of Ballinamintra. *Trans. R. Dublin Soc.*, Vol. vii. (s. 2), 1881.

The ancient Irish Wolf in its dentition approached the large Arctic Wolf, at present found in the extreme north of North America.[1]

There is strong evidence, therefore, for the belief that the Wolf existed in Ireland in very remote times, probably before man appeared in the country. And there can be no doubt that it was indigenous and must have migrated to Ireland in company with or at about the same time as the Bear and the other large extinct mammals referred to. I cannot attempt here to discuss my reasons for the belief that all these creatures wandered to Ireland before the latter had become separated from Great Britain. I have done so in other writings, and it is not of vital importance in any case. We may assume either that the Wolf of the British Islands came of the northern stock and was of a more powerful build than the continental race, or else that the Wolf all over Europe degenerated in its dentition in the course of time. Even Prof. Owen long ago drew attention to the resemblance of a Wolf's skull from Kent's Hole in England with that of the Arctic Wolf.[2] The Wolf certainly arrived in England in pre-glacial times, for it occurs in the Forest Bed, which belongs to the Pliocene Age. That it was contemporaneous in Ireland with the Irish Elk has already been alluded to, and Prof. Leith Adams expressed the opinion that herds of the latter were probably driven into lakes by wolves and found their death in them.[3]

One of the earliest historical proofs of the existence of the Wolf in Ireland comes to us from Giraldus Cambrensis, who visited this country in the twelfth century. He pointed out that either in consequence of the great mildness of the climate or else in token of the evils of treason and rapine, which are ripe here before their proper season, wolves have often whelps in the month of December.

---

[1] Scharff, Seymour and Newton: Exploration of Castlepook Cave Co. Cork. *Proc. R. Irish Acad.*, Vol. xxxiv. (Section B), 1918.

[2] Richard Owen: History of British Fossil Mammals and Birds, 1846.

[3] A. Leith Adams: On the recent and extinct Irish Mammals. *Proc. R. Dublin Society* (N.S.), Vol. ii., 1878.

Wolves seem to have become more plentiful in Ireland during the sixteenth and seventeenth centuries; and it was the custom then to drive cattle and sheep into special enclosures at night to protect them from the ravages of their inveterate enemy. In the reign of James I. an Act was passed in 1611 for the killing of wolves and other vermin; and in the year 1652 Cromwell issued an Order in Council prohibiting the exportation of Wolf-dogs from Ireland. To offer special inducements for the destruction of Wolves, the sum of £6 was offered by the State for every bitch wolf and £5 for a male wolf. For a cub able to hunt for itself £2 was paid, and ten shillings for every suckling cub. All these measures had the desired effect, and wolves rapidly diminished all over the country. It is stated that the last wolf in Connaught was killed about the year 1700. But in other places it seems to have survived still longer. Thompson tells us that it was not finally extirpated in Kerry until 1710, and that three places are commemorated each as having had the last Irish Wolf killed there, viz., one in the South, another near Glenarm, and a third—Wolfhill—three miles from Belfast.[1] According to Richardson, Wolves were still known to be in Wexford about the years 1730-40, and he affirms that a Wolf was killed in the Wicklow Mountains in 1770.[2] In England it had already disappeared during the reign of Henry VII.; while it lingered on in Scotland until the year 1743.

It is interesting to note that no absolutely reliable distinction between the Wolf and the large Irish Wolf-hound has as yet been discovered. The limb bones of the two are quite indistinguishable. The molar teeth among what we believe to have been wolf-remains in the Irish caves are no doubt larger than those of the Wolf-hound, but they also exceed in size those of the modern European Wolf. Only the complete skull furnishes a fairly reliable test. This test is founded on the position of the eye-sockets. It is a well known fact that the position of the eyes does not

---

[1] William Thompson: Natural History of Ireland, Vol. iv., 1856.

[2] H. D. Richardson: The Irish Wolf-dog. *Irish Penny Journal*, 1841

enable the wolf to squarely look at a spectator standing in front of him. This is because the eye-sockets are directed slightly towards the sides instead of facing the object. Prof. Studer first drew attention to this distinction in the skulls of wolves and dogs, and argued that the plane of the eye-socket is more obliquely inclined to the brow, that is to say, the orbito-frontal angle is less in wolves than it is in dogs. No doubt this feature is the most important character of distinction between wolves and dogs; but, as Professor Reynolds points out, even it cannot be relied on in all cases.[1] It requires an instrument called a clinometer to measure the angle referred to, and it is by no means easy to do so. Considering that the Irish Wolf-dog has probably originated from the Wolf, it is not surprising that the distinctive characters between Wolf and Dog should be so very subtle and difficult to determine.

The question whether the Irish Wolf was identical with or belonged to the same species as the wolf still living in France is not easy to answer. Although the Wolf was so extremely abundant in Ireland in the sixteenth and seventeenth centuries, and probably before that, we do not possess a single Wolf's skull or even a bone of that period. We have no means, therefore, of comparing a modern Irish Wolf skeleton with that of a modern French Wolf. But considering that large races of the Wolf are known to have existed on the Continent in Pleistocene times, that several other large animals came to Ireland from Continental Europe, it seems not unlikely that the Irish and French Wolves originated from a common stock.

The common Irish word for Wolf is "mac-tire," but a number of other words signifying wild dog, such as "madradh allaidh," "faelchú," "cú allaidh," and "madra allta," seem to have been in use. Two perhaps older words are "sidheach" and "crian." There is still another word that has been employed for Wolf, viz., "glaoidheamhan." It means a howler.

Knockranny, Bray.

---

[1] P. H. Reynolds: The Canidae. *Palaeontological Society*, 1909.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

November 8.—The Club met at the Royal College of Surgeons.

D. McArdle showed the conidial stage of the Poplar-twig Fungus *Didymosphaeria populina*. The specimens exhibited were taken from the dead portion of the bark-wood on a shoot where infection took place; the numerous conidia are fusiform in shape with slightly curved ends 3-celled when matured. The affected tree *Populus lasiocarpa* shows the first appearance of the disease by a dark brown spot on the side of a young twig, which gradually develops quite around it, and marks the distance the mycelium has ascended; as a result the young shoot and leaves become discoloured and bend inwards and die. The buds below this part produce fresh shoots which in their turn also become affected; the lower part of the tree becomes bushy owing to the production of suckers; on the destruction of the young shoots these also become affected. On the older branches large open rough wounds are seen sometimes exposing the wood; the infected spots join each other in time, quite encircling or ringing the branch, the portion above the wound dying.

H. A. Lafferty exhibited preparations of *Phytophthora syringae*, a fungus which has recently been recorded as causing a rot of apples in this country.

DUBLIN NATURALISTS' FIELD CLUB.

May 6.—Excursion to the Zoological Gardens.—The chief object of this excursion, which was well attended, was to inspect and study the recently established Irish Aquarium, which is being stocked for the special purpose of facilitating the study of our native reptiles, batrachians, small fishes, and as many as can be conveniently kept together and exhibited of the freshwater mollusca and aquatic insects and spiders. Mr. C. H. Bretherton, on whose shoulders the work of planning and stocking this aquarium has hitherto almost entirely rested, acted as conductor and gave an interesting account of the various inmates as they came into view, hoping, as he explained, to enlist the activities of members of the Club in collecting for the aquarium. After tea in the Haughton House the members dispersed in groups to visit the various animals.

June 17.—Excursion to Ireland's Eye.—The party of 23 members and friends met at Howth and crossed over to Ireland's Eye in motor boats. An enjoyable two hours was spent on the island by the party, during which the seabird colonies were visited, including those of the Razorbill, Puffin, Herring Gull and Kittiwake. A pair of Great Black-backed Gulls were seen gilding majestically overhead and the nesting hole of a Manx Shearwater was found under a rock. Meadow Pipits were numerous as were the Rock Pipits, many of which were singing about the cliffs on the eastern side. Only twenty species of birds were

observed, but what was lacking in variety was compensated by numbers. The visit was made too late in the season to find the beautiful *Scilla verna* in flower and only the leaves and seed-heads were seen. Another plant of interest, the Hound's-tongue (*Cynoglossum officinale*) was found in flower on the margin of the seashore. At five o'clock the party re-embarked for the voyage back to Howth, during which an excellent view of a Black Guillemot was obtained from the boats as it swam by.

July 15.—Excursion to Delgany.—By kind invitation of Mr. Ireton P. Jones, an excursion attended by over 30 members was made to Pennick's Nurseries, Delgany. Mr. Jones, who acted as conductor, called attention to many of the more remarkable trees, shrubs, and other plants in the very picturesque grounds in which his garden is situated, and also offered prizes for the best answers to a series of printed questions on the cultivated plants, weeds, and insects that came under notice. The large party were afterwards most hospitably entertained by Mr. and Mrs. Jones, and returned by a pleasant walk across fields to Greystones, reaching Dublin about 7 p.m.

August 5.—Excursion to the Scalp.—This excursion, originally fixed for a July date, but unavoidably postponed, was held in a month generally found unfavourable to any prospect of large attendance. About 15 members, however, took part. The route followed from Carrickmines station was *via* Ballycorus, a longer but more diversified walk than the direct road through Kilternan. The party were struck with the extraordinary abundance along nearly the whole distance of that aggressive colonist *Matricaria discoidea*, first noticed here by Mr. Colgan (at the Carrickmines extremity of the lane) in 1894. After tea at the Scalp Villa return was made by the same route, a few local plants, such as *Senecio sylvaticus*, attracting attention in the course of the walk.

September 16.—Excursion to St. Doulough's.—The visit to the celebrated limestone quarry in this district was made under the guidance of Mr. Hinch, who explained the extraordinary difficulties surrounding the question of the exact geological age of the deposits. Some time was spent in searching and collecting characteristic fossils, after which the party visited the ancient church, of whose early history an account was then read by Mrs. Long. After leaving the church the party repaired, by kind invitation of General and Miss A. G. Twigg, to the sexton's house, where all were entertained to tea; and after a vote of thanks to their entertainers and the transaction of some formal business the Club returned by rail to Dublin.

October 28.—Excursion to Kilruddery.—The concluding excursion of the season (one not included in the original programme) took the form of a fungus foray, which the Club was kindly permitted to make in Kilruddery demesne under the conductorship of Mr. M. J. Gorman. Some 25 members and friends took part in the foray, and a considerable number of interesting fungi were collected, and the distinguishing features of the various groups to which they belonged clearly pointed out by the conductor. It was, however, found that from the mycological point of

view the season was drawing rapidly to a close, and better results might have been obtained had the excursion been held about a fortnight sooner. The party were afterwards very hospitably entertained by Mrs. Brambell, at Ashbury, Bray

BELFAST NATURALISTS' FIELD CLUB.

SEPTEMBER 30.—GREYABBEY.—Thirty-four members motored to Greyabbey and Ballywalter. On arrival at Greyabbey the conductor (A. M'I. CLELAND) gave an address on the history and principal points of architectural note in the beautiful ruins.

Having thoroughly inspected the ruins, the members proceeded to Ballywalter, where tea was served. At the business meeting the Chairman (S. A. BENNETT B.A., B.Sc.) briefly outlined the programme for the coming winter session, and gave his experiences as delegate to the British Association meetings in Hull.

NOTES.

ZOOLOGY.

Gynandromorphs of Euchloe cardamines in East Tyrone.

On May 27th last I had the good fortune to capture the two aberrations of this species described below. The late Mr. Wm. F. de V. Kane in his Catalogue did not know of any Irish gynandromorphous examples of this species.

No. 1, female ; upper side, left fore-wing with a broad stripe of orange extending from the discoidal into the apical blotch, right fore-wing normal ; underside, left fore-wing has a large orange patch from discoidal to apical blotch covering almost two-thirds of the wing in this area ; right fore-wing with three parallel streaks from discoidal to outer margin ; sub-costal veins broadly streaked with yellow.

No. 2 var *caulosticta*, Wms., upperside right fore-wing with irregular orange streaks from discoidal to outer margin, another broader stripe just below this extending into the apical blotch ; posterior wings with well defined discal spots ; underside, left fore-wing with three parallel stripes of orange, the first above discoidal, the second just below, and the third near the anal angle ; right fore-wing with a triangular patch of orange extending from and enclosing the discoidal, to apical blotch ; sub-costal area yellow.

THOMAS GREER,

Stewartstown.

Swans in Valentia Harbour.

It may be of interest to readers of the *Irish Naturalist* to put on record that wild swans appeared in Valentia Harbour on 19th and 20th of October. I have never seen them here before. Two swans were seen on the 19th and on the morning of 20th. We saw one feeding along the shore in shallow water, evidently a young bird. Two birds were seen that day on a small pond but were frightened and hunted, and one was wounded and found dead on 23rd. This bird was measured; three feet seven inches from tip of beak to end of tail, and six feet across the wings. The bill reddish, with black tip, base of bill and front of head rusty yellow; head, neck, back and wing covers light grey, breast and under tail white, wings white, quills very light grey, feet and legs greenish grey, black webs, only weighed six lbs. I have kept the wings and covers, and the sternum and trachea, as this is apparently necessary for identification. The trachea is very curious; it is curved into a cavity in the keel of the sternum which seems to be a peculiarity of the Whooper, according to my books. I should think the bird is young, as plumage looks downy. On November 1st two swans seen flying in a south-easterly direction about 9 a.m. On November 2nd a fine swan was seen flying south-east at 8.30 a.m.

M. J. Delap.

Valentia Island, Co. Kerry.

Swans on Strangford Lough.

While visiting the Castle Espie district on Strangford Lough early in October with a friend, we noticed a very large number of swans on the lough a little north of Castle Espie; there must have been well over 200 in all here. Further south, near Ringneil, we saw another big group of fully 50 more. Is this not an unusual number of these birds to be seen together on salt water?

Belfast. Robert Bell.

The Gull and the Golf Ball.

During a match on the Ballycastle golf links lately, in the Dolphin Cup competition, a curious incident occurred. A player made a long drive, the ball lying out in the open. Suddenly, to the surprise of those present watching the match, a large sea-gull (Herring Gull or Blackbacked) was seen to swoop down on the ball, pick it up and fly away with it in its beak.

Belfast. R. J. Welch.

Vol. XXXI No. 1.
JANUARY, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No 1. The Warble Fly
„ 2 The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf-Spot Disease or Blight.
„ 6 Charlock (or Preshaugh) Spraying
„ 7. Fluke in Sheep.
„ 8 Timothy Meadows
„ 9. The Turnip Fly
„ 10. Wireworms.
„ 11. Prevention of White Scour in Calves
„ 12. Liquid Manure
„ 13. Contagious Abortion in Cattle.
„ 14 Prevention of Potato Blight
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures
„ 18 Swine Fever.
„ 19. Early Potato Growing
„ 20. Calf Rearing
„ 21. Diseases of Poultry:—Gapes
„ 22. Basic Slag.
„ 23 Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31 Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33. Profitable Breeds of Poultry.
34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes
„ 39. „ Mangels.
„ 40 „ „ Oats.
„ 41. „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves
„ 45. Ringworm on Cattle
„ 46 Haymaking
„ 47. The Black Currant Mite
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51. The Leather-Jacket Grub.
„ 52. Flax Growing Experiments.

No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop.
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes
„ 59. Testing of Farm Seeds
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat
„ 62. The Management of Dairy Cows
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64. Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69 The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73 The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing
„ 76 American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78 Home Buttermaking
„ 79. The Cultivation of Small Fruits
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms
„ 82. Cultivation of Main Crop Potatoes
„ 83. Cultivation of Osiers.
„ 84. Ensilage.
„ 85 Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87 Barley Threshing
„ 88. The Home Bottling of Fruit
„ 89 The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes
„ 92 Home Preservation of Eggs
„ 93 Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle or Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching
„ 97. Weeds
„ 98. Tuberculosis in Poultry.
„ 99 Seaweed as Manure

SPECIAL LEAFLETS.

8. Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary Department of Agriculture and Technical Instruction for Ireland Upper Merrion Street, Dublin. Letters applying for application so addressed need not be stamped. Envelopes should be marked "Publications."

Dickson's

HAWLMARK SEEDS

"The MARK AND STAMP of QUALITY"
EMERSON

86 YEARS' REPUTATION BEHIND THEM.

See our Catalogue before ordering.

ALEX. DICKSON & SONS,

LIMITED,

Hawlmark—61 DAWSON ST., DUBLIN.

Vol. xxxi., No. 1. January, 1922.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI No. 2.
FEBRUARY, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. *(Sundays from* **12** *noon)* **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No 1. The Warble Fly
„ 2 The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf-Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying
„ 7 Fluke in Sheep.
„ 8 Timothy Meadows
„ 9. The Turnip Fly
„ 10. Wireworms.
„ 11. Prevention of White Scour in Calves
„ 12. Liquid Manure
„ 13. Contagious Abortion in Cattle.
„ 14 Prevention of Potato Blight
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures.
„ 18 Swine Fever.
„ 19. Early Potato Growing.
„ 20. Calf Rearing.
„ 21. Diseases of Poultry:—Gapes
„ 22. Basic Slag.
„ 23. Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33. Profitable Breeds of Poultry.
„ 34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes
„ 39. „ Mangels.
„ 40 „ „ Oats.
„ 41. „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves
„ 45. Ringworm on Cattle
„ 46 Haymaking.
„ 47. The Black Currant Mite.
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop.
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes
„ 59. Testing of Farm Seeds
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64. Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73 The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing
„ 76 American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78 Home Buttermaking.
„ 79. The Cultivation of Small Fruits
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms
„ 82. Cultivation of Main Crop Potatoes
„ 83. Cultivation of Osiers.
„ 84. Ensilage.
„ 85. Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87 Barley Threshing
„ 88. The Home Bottling of Fruit
„ 89 The Construction of Piggeries.
„ 96. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes
„ 92 Home Preservation of Eggs.
„ 93. Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching
„ 97. Weeds.
„ 98. Tuberculosis in Poultry.
„ 99 Seaweed as Manure

SPECIAL LEAFLETS.

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters on application so addressed need not be stamped. Envelopes should be marked "Publications."

Vol. xxxi., No. 2. February, 1922.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI No. 3.
MARCH, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. *(Sundays from* **12** *noon)* **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No 1. The Warble Fly
„ 2 The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf-Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying
„ 7. Fluke in Sheep.
„ 8 Timothy Meadows
„ 9. The Turnip Fly
„ 10. Wireworms.
„ 11. Prevention of White Scour in Calves
„ 12 Liquid Manure
„ 13. Contagious Abortion in Cattle.
„ 14 Prevention of Potato Blight.
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures
„ 18 Swine Fever.
„ 19 Early Potato Growing
„ 20. Calf Rearing
„ 21 Diseases of Poultry :—Gapes
„ 22. Basic Slag.
„ 23 Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed
„ 30. Poultry Parasites—Fleas, Mites and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33. Profitable Breeds of Poultry
34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes
„ 39. „ „ Mangels.
„ 40 „ „ Oats.
„ 41. „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves
„ 45. Ringworm on Cattle
„ 46 Haymaking
„ 47. The Black Currant Mite.
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax. Growing Experiments.

No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop.
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes
„ 59. Testing of Farm Seeds.
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64 Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73 The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing
„ 76 American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78 Home Buttermaking
„ 79. The Cultivation of Small Fruits.
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms.
„ 82. Cultivation of Main Crop Potatoes.
„ 83. Cultivation of Osiers.
„ 84 Ensilage.
„ 85 Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87 Barley Threshing
„ 88. The Home Bottling of Fruit.
„ 89 The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes
„ 92 Home Preservation of Eggs.
„ 93 Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching.
„ 97. Weeds.
„ 98. Tuberculosis in Poultry.
„ 99 Seaweed as Manure.

SPECIAL LEAFLETS.

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin, Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

ALEX. DICKSON & SONS, LTD.

ESTABLISHED 1836

61 DAWSON ST., DUBLIN — NURSERIES, BLACKROCK

RAISERS OF PEDIGREE IRISH SEEDS.

"THE HAWLMARK" DICKSONS'

RAISERS OF PEDIGREE IRISH ROSES.

For 1922

Dickson's

HAWLMARK SEEDS

"The MARK AND STAMP of QUALITY"

EMERSON

86 YEARS' REPUTATION BEHIND THEM.

See our Catalogue before ordering.

ALEX. DICKSON & SONS,

LIMITED,

Hawlmark—61 DAWSON ST., DUBLIN.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI No. 4.
APRIL, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. *(Sundays from* **12** *noon)* **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No 1. The Warble Fly
„ 2 The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf-Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying
„ 7. Fluke in Sheep.
„ 8. Timothy Meadows
„ 9. The Turnip Fly
„ 10. Wireworms.
„ 11. Prevention of White Scour in Calves
„ 12. Liquid Manure.
„ 13. Contagious Abortion in Cattle.
„ 14 Prevention of Potato Blight.
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures.
„ 18 Swine Fever.
„ 19 Early Potato Growing.
„ 20. Calf Rearing.
„ 21. Diseases of Poultry :—Gapes
„ 22. Basic Slag.
„ 23. Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33. Profitable Breeds of Poultry
„ 34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes
„ 39. „ „ Mangels.
„ 40 „ „ Oats.
„ 41. „ „ Turnips
„ 42 Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves
„ 45. Ringworm on Cattle
„ 46 Haymaking
„ 47. The Black Currant Mite.
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop.
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes
„ 59. Testing of Farm Seeds.
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64 Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry :. The Planting of Waste Lands.
„ 66. Forestry : The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry : Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73 The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing
„ 76 American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78 Home Buttermaking
„ 79. The Cultivation of Small Fruits.
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms.
„ 82. Cultivation of Main Crop Potatoes.
„ 83. Cultivation of Osiers.
„ 84 Ensilage.
„ 85 Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87 Barley Threshing
„ 88. The Home Bottling of Fruit.
„ 89 The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes
„ 92 Home Preservation of Eggs.
„ 93. Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching.
„ 97. Weeds
„ 98. Tuberculosis in Poultry.
„ 99 Seaweed as Manure.

SPECIAL LEAFLETS.

8. Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland. Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

Dickson's

HAWLMARK SEEDS

"The MARK AND STAMP of QUALITY"
EMERSON

86 YEARS' REPUTATION BEHIND THEM.

See our Catalogue before ordering.

ALEX. DICKSON & SONS,

LIMITED,

Hawlmark—61 DAWSON ST., DUBLIN.

Vol. xxxi., No. 4. April, 1922.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI No. 5.
MAY, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.
AND
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
,, 2. The Use and Purchase of Feeding Stuffs.
,, 3. Foot Rot in Sheep.
,, 4. Intensive and Semi-Intensive Poultry Keeping.
,, 5. Celery Leaf Spot Disease or Blight.
,, 6. Charlock (or Preshaugh) Spraying.
,, 7. Fluke in Sheep.
,, 8. Timothy Meadows.
,, 9. The Turnip Fly.
,, 10. Wireworms.
,, 11. Preventive of White Scour in Calves.
,, 12. Liquid Manure.
,, 13. Contagious Abortion in Cattle.
,, 14. Prevention of Potato Blight.
,, 15. Milk Records.
,, 16. Sheep Scab.
,, 17. The Use and Purchase of Manures.
,, 18. Swine Fever.
,, 19. Early Potato Growing.
,, 20. Calf Rearing.
,, 21. Diseases of Poultry:—Gapes.
,, 22. Basic Slag.
,, 23 Dishorning Calves.
,, 24. Care and Treatment of Premium Bulls.
,, 25. Fowl Cholera.
,, 26. Winter Fattening of Cattle.
,, 27. Breeding and Feeding of Pigs.
,, 28. Blackleg, Black Quarter, or Blue Quarter
,, 29 Flax Seed.
,, 30. Poultry Parasites—Fleas, Mites, and Lice.
,, 31. Winter Egg Production.
,, 32. Rearing and Fattening of Turkeys
,, 33 Profitable Breeds of Poultry
,, 34. *Out of Print.*
,, 35. The Liming of Land.
,, 36 Field Experiments—Barley.
,, 37. ,, ,, Meadow Hay
,, 38 ,, ,, Potatoes.
,, 39. ,, ,, Mangels.
,, 40 ,, ,, Oats.
,, 41. ,, ,, Turnips
,, 42. Permanent Pasture Grasses
,, 43. The Rearing and Management of Chickens
,, 44 "Husk" or "Hoose" in Calves.
,, 45. Ringworm on Cattle
,, 46 Haymaking
,, 47. The Black Currant Mite.
,, 48 Foul Brood or Bee Pest.
,, 49. Poultry Fattening.
,, 50 Portable Poultry Houses
,, 51 The Leather-Jacket Grub.
,, 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
,, 54. *Out of Print.*
,, 55. The Apple.
,, 56. Cultivation of the Root Crop.
,, 57. Marketing of Fruit.
,, 58. Sprouting Seed Potatoes.
,, 59. Testing of Farm Seeds.
,, 60 *Out of Print.*
,, 61. Field Experiments—Wheat.
,, 62. The Management of Dairy Cows.
,, 63. "Redwater" or "Blood-Murrain" in Cattle.
,, 64 Varieties of Fruit Suitable for Cultivation in Ireland.
,, 65. Forestry: The Planting of Waste Lands.
,, 66. Forestry: The Proper Method of Planting Forest Trees.
,, 67. *Out of Print.*
,, 68. *Out of Print.*
,, 69. The Prevention of Tuberculosis in Cattle.
,, 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
,, 71. *Out of Print.*
,, 72. *Out of Print.*
,, 73. The Planting and Management of Hedges.
,, 74. Some Common Parasites of the Sheep.
,, 75. Barley Sowing.
,, 76. American Gooseberry Mildew.
,, 77. Scour and Wasting in Young Cattle.
,, 78. Home Buttermaking
,, 79. The Cultivation of Small Fruits.
,, 80. Catch Crops.
,, 81. Potato Culture on Small Farms.
,, 82. Cultivation of Main Crop Potatoes.
,, 83. Cultivation of Osiers.
,, 84. Ensilage
,, 85. Some Injurious Orchard Insects.
,, 86. Dirty Milk.
,, 87. Barley Threshing.
,, 88. The Home Bottling of Fruit.
,, 89. The Construction of Piggeries.
,, 90. The Advantages of Early Ploughing.
,, 91. Black Scab in Potatoes.
,, 92. Home Preservation of Eggs.
,, 93. Marketing of Wild Fruits.
,, 94. *Out of Print.*
,, 95. Store Cattle *or* Butter, Bacon, and Eggs.
,, 96. Packing Eggs for Hatching.
,, 97. Weeds.
,, 98. Tuberculosis in Poultry.
,, 99. Seaweed as Manure.

SPECIAL LEAFLETS.

8. Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland. Upper Merrion Street. Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,

Keeper, National History Department, Royal Scottish Museum, Edinburgh

WILLIAM EVANS, F.R.S.E.

Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,

Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin.

R. LLOYD PRAEGER,
National Library, Dublin.

Vol. xxxi., No. 5. May, 1922.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI No. 6.
JUNE, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1S.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to —

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
,, 2. The Use and Purchase of Feeding Stuffs.
,, 3. Foot Rot in Sheep.
,, 4. Intensive and Semi-Intensive Poultry Keeping.
,, 5. Celery Leaf Spot Disease or Blight.
,, 6. Charlock (or Preshaugh) Spraying.
,, 7. Fluke in Sheep.
,, 8. Timothy Meadows.
,, 9. The Turnip Fly.
,, 10. Wireworms.
,, 11. Preventive of White Scour in Calves.
,, 12. Liquid Manure.
,, 13. Contagious Abortion in Cattle.
,, 14. Prevention or Potato Blight.
,, 15. Milk Records.
,, 16. Sheep Scab.
,, 17. The Use and Purchase of Manures.
,, 18. Swine Fever.
,, 19. Early Potato Growing.
,, 20. Calf Rearing.
,, 21. Diseases of Poultry :—Gapes.
,, 22. Basic Slag.
,, 23 Dishorning Calves.
,, 24. Care and Treatment of Premium Bulls.
,, 25. Fowl Cholera.
,, 26. Winter Fattening of Cattle.
,, 27. Breeding and Feeding of Pigs.
,, 28. Blackleg, Black Quarter, or Blue Quarter
,, 29 Flax Seed.
,, 30. Poultry Parasites—Fleas, Mites, and Lice.
,, 31. Winter Egg Production.
,, 32. Rearing and Fattening of Turkeys
,, 33 Profitable Breeds of Poultry
,, 34. *Out of Print.*
,, 35. The Liming of Land.
,, 36 Field Experiments—Barley.
,, 37. ,, ,, Meadow Hay
,, 38 ,, ,, Potatoes.
,, 39. ,, ,, Mangels.
,, 40 ,, ,, Oats.
,, 41 ,, ,, Turnips
,, 42. Permanent Pasture Grasses
,, 43. The Rearing and Management of Chickens
,, 44 "Husk" or "Hoose" in Calves.
,, 45. Ringworm on Cattle
,, 46 Haymaking.
,, 47. The Black Currant Mite.
,, 48 Foul Brood or Bee Pest.
,, 49. Poultry Fattening.
,, 50 Portable Poultry Houses
,, 51 The Leather-Jacket Grub.
,, 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
,, 54. *Out of Print.*
,, 55. The Apple.
,, 56. Cultivation of the Root Crop
,, 57. Marketing of Fruit.
,, 58. Sprouting Seed Potatoes.
,, 59. Testing of Farm Seeds.
,, 60 *Out of Print.*
,, 61. Field Experiments—Wheat.
,, 62. The Management of Dairy Cows.
,, 63. "Redwater" or "Blood-Murrain" in Cattle.
,, 64 Varieties of Fruit Suitable for Cultivation in Ireland.
,, 65. Forestry: The Planting of Waste Lands.
,, 66. Forestry: The Proper Method of Planting Forest Trees.
,, 67. *Out of Print.*
,, 68. *Out of Print.*
,, 69. The Prevention of Tuberculosis in Cattle.
,, 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
,, 71. *Out of Print.*
,, 72. *Out of Print.*
,, 73. The Planting and Management of Hedges.
,, 74. Some Common Parasites of the Sheep.
,, 75 Barley Sowing.
,, 76. American Gooseberry Mildew.
,, 77. Scour and Wasting in Young Cattle.
,, 78. Home Buttermaking.
,, 79. The Cultivation of Small Fruits.
,, 80. Catch Crops.
,, 81. Potato Culture on Small Farms.
,, 82. Cultivation of Main Crop Potatoes.
,, 83. Cultivation of Osiers.
,, 84. Ensilage
,, 85. Some Injurious Orchard Insects.
,, 86. Dirty Milk.
,, 87. Barley Threshing.
,, 88. The Home Bottling of Fruit.
,, 89. The Construction of Piggeries.
,, 90. The Advantages of Early Ploughing.
,, 91. Black Scab in Potatoes.
,, 92. Home Preservation of Eggs.
,, 93. Marketing of Wild Fruits.
,, 94. *Out of Print.*
,, 95. Store Cattle *or* Butter, Bacon, and Eggs.
,, 96. Packing Eggs for Hatching.
,, 97. Weeds.
,, 98. Tuberculosis in Poultry.
,, 99. Seaweed as Manure.

SPECIAL LEAFLETS

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland. Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,
EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin.

R. LLOYD PRAEGER,
National Library, Dublin.

Vol. xxxi., No. 6. June, 1922.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI. No. 7.
JULY, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
„ 2. The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep.
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying.
„ 7. Fluke in Sheep.
„ 8. Timothy Meadows.
„ 9. The Turnip Fly.
„ 10. Wireworms.
„ 11. Preventive of White Scour in Calves.
„ 12. Liquid Manure.
„ 13. Contagious Abortion in Cattle.
„ 14. Prevention of Potato Blight.
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures.
„ 18. Swine Fever.
„ 19. Early Potato Growing.
„ 20. Calf Rearing.
„ 21. Diseases of Poultry:—Gapes.
„ 22. Basic Slag.
„ 23. Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs.
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed.
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33 Profitable Breeds of Poultry
„ 34. *Out of Print.*
„ 35. The Liming of Land.
„ 36. Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes.
„ 39. „ „ Mangels.
„ 40 „ „ Oats.
„ 41. „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves.
„ 45. Ringworm on Cattle
„ 46 Haymaking.
„ 47. The Black Currant Mite.
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes.
„ 59. Testing of Farm Seeds.
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64 Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73. The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75. Barley Sowing.
„ 76. American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78. Home Buttermaking
„ 79. The Cultivation of Small Fruits.
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms.
„ 82. Cultivation of Main Crop Potatoes.
„ 83. Cultivation of Osiers.
„ 84. Ensilage
„ 85. Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87. Barley Threshing.
„ 88. The Home Bottling of Fruit.
„ 89. The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes.
„ 92. Home Preservation of Eggs.
„ 93. Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching.
„ 97. Weeds.
„ 98. Tuberculosis in Poultry.
„ 99. Seaweed as Manure.

SPECIAL LEAFLETS.

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin.

R. LLOYD PRAEGER,
National Library, Dublin

Vol. xxxi., No. 7. July, 1922.

CONTENTS

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI. No. 8.
AUGUST, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.E., D.Sc., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1S.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BROWN, HIMALAYAN AND POLAR BEARS.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
,, 2. The Use and Purchase of Feeding Stuffs.
,, 3. Foot Rot in Sheep.
,, 4. Intensive and Semi-Intensive Poultry Keeping.
,, 5. Celery Leaf Spot Disease or Blight.
,, 6. Charlock (or Preshaugh) Spraying.
,, 7. Fluke in Sheep.
,, 8. Timothy Meadows.
,, 9. The Turnip Fly.
,, 10. Wireworms.
,, 11. Preventive of White Scour in Calves.
,, 12. Liquid Manure.
,, 13. Contagious Abortion in Cattle.
,, 14. Prevention of Potato Blight.
,, 15. Milk Records.
,, 16. Sheep Scab.
,, 17. The Use and Purchase of Manures.
,, 18. Swine Fever.
,, 19. Early Potato Growing.
,, 20. Calf Rearing.
,, 21. Diseases of Poultry:—Gapes.
,, 22. Basic Slag.
,, 23 Dishorning Calves.
,, 24. Care and Treatment of Premium Bulls.
,, 25. Fowl Cholera.
,, 26. Winter Fattening of Cattle.
,, 27. Breeding and Feeding of Pigs.
,, 28. Blackleg, Black Quarter, or Blue Quarter.
,, 29 Flax Seed.
,, 30. Poultry Parasites—Fleas, Mites and Lice.
,, 31. Winter Egg Production.
,, 32. Rearing and Fattening of Turkeys.
,, 33 Profitable Breeds of Poultry.
,, 34. *Out of Print.*
,, 35. The Liming of Land.
,, 36 Field Experiments—Barley.
,, 37. ,, ,, Meadow Hay.
,, 38 ,, ,, Potatoes.
,, 39. ,, ,, Mangels.
,, 40 ,, ,, Oats.
,, 41 ,, ,, Turnips.
,, 42. Permanent Pasture Grasses.
,, 43. The Rearing and Management of Chickens.
,, 44 "Husk" or "Hoose" in Calves.
,, 45. Ringworm on Cattle.
,, 46 Haymaking.
,, 47. The Black Currant Mite.
,, 48 Foul Brood or Bee Pest.
,, 49. Poultry Fattening.
,, 50 Portable Poultry Houses.
,, 51 The Leather-Jacket Grub.
,, 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
,, 54. *Out of Print.*
,, 55. The Apple.
,, 56. Cultivation of the Root Crop.
,, 57. Marketing of Fruit.
,, 58. Sprouting Seed Potatoes.
,, 59. Testing of Farm Seeds.
,, 60 *Out of Print.*
,, 61. Field Experiments—Wheat.
,, 62. The Management of Dairy Cows.
,, 63. "Redwater" or "Blood-Murrain" in Cattle.
,, 64 Varieties of Fruit Suitable for Cultivation in Ireland.
,, 65. Forestry: The Planting of Waste Lands.
,, 66. Forestry: The Proper Method of Planting Forest Trees.
,, 67. *Out of Print.*
,, 68. *Out of Print.*
,, 69. The Prevention of Tuberculosis in Cattle.
,, 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
,, 71. *Out of Print.*
,, 72. *Out of Print.*
,, 73. The Planting and Management of Hedges.
,, 74. Some Common Parasites of the Sheep.
,, 75 Barley Sowing.
,, 76. American Gooseberry Mildew.
,, 77. Scour and Wasting in Young Cattle.
,, 78. Home Buttermaking.
,, 79. The Cultivation of Small Fruits.
,, 80. Catch Crops.
,, 81. Potato Culture on Small Farms.
,, 82. Cultivation of Main Crop Potatoes.
,, 83. Cultivation of Osiers.
,, 84. Ensilage.
,, 85. Some Injurious Orchard Insects.
,, 86. Dirty Milk.
,, 87. Barley Threshing.
,, 88. The Home Bottling of Fruit.
,, 89 The Construction of Piggeries.
,, 90. The Advantages of Early Ploughing.
,, 91. Black Scab in Potatoes.
,, 92. Home Preservation of Eggs.
,, 93. Marketing of Wild Fruits.
,, 94. *Out of Print.*
,, 95. Store Cattle *or* Butter, Bacon, and Eggs.
,, 96. Packing Eggs for Hatching.
,, 97. Weeds.
,, 98. Tuberculosis in Poultry.
,, 99. Seaweed as Manure.

SPECIAL LEAFLETS

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin.

R. LLOYD PRAEGER,
National Library, Dublin

Vol. xxxi., No. 8. August, 1922.

CONTENTS

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI, No. 9.
SEPTEMBER, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB.

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.E., D.Sc., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1S.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BLACK LEOPARD NEWLY ARRIVED.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to —

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
„ 2. The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep.
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying.
„ 7. Fluke in Sheep.
„ 8. Timothy Meadows.
„ 9. The Turnip Fly.
„ 10. Wireworms.
„ 11. Preventive of White Scour in Calves.
„ 12. Liquid Manure.
„ 13. Contagious Abortion in Cattle.
„ 14. Prevention of Potato Blight.
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures.
„ 18. Swine Fever.
„ 19. Early Potato Growing.
„ 20. Calf Rearing.
„ 21. Diseases of Poultry:—Gapes.
„ 22. Basic Slag.
„ 23 Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs.
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed.
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33 Profitable Breeds of Poultry
„ 34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes
„ 39. „ „ Mangels.
„ 40 „ „ Oats.
„ 41 „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves.
„ 45. Ringworm on Cattle
„ 46 Haymaking.
„ 47. The Black Currant Mite.
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes.
„ 59. Testing of Farm Seeds.
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64 Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73. The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing.
„ 76. American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78. Home Buttermaking
„ 79. The Cultivation of Small Fruits.
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms.
„ 82. Cultivation of Main Crop Potatoes.
„ 83. Cultivation of Osiers.
„ 84. Ensilage
„ 85. Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87. Barley Threshing.
„ 88. The Home Bottling of Fruit.
„ 89 The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes.
„ 92. Home Preservation of Eggs.
„ 93. Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching.
„ 97. Weeds.
„ 98. Tuberculosis in Poultry.
„ 99. Seaweed as Manure.

SPECIAL LEAFLETS.

8. Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin.

R. LLOYD PRAEGER,
National Library, Dublin

Vol. xxxi., No. 9. September, 1922.

CONTENTS

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI No. 10.
OCTOBER, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.E., D.Sc., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BLACK LEOPARD NEWLY ARRIVED.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
,, 2. The Use and Purchase of Feeding Stuffs.
,, 3. Foot Rot in Sheep.
,, 4. Intensive and Semi-Intensive Poultry Keeping.
,, 5. Celery Leaf Spot Disease or Blight.
,, 6. Charlock (or Preshaugh) Spraying.
,, 7. Fluke in Sheep.
,, 8 Timothy Meadows.
,, 9 The Turnip Fly.
,, 10. Wireworms.
,, 11. Preventive of White Scour in Calves.
,, 12. Liquid Manure.
,, 13. Contagious Abortion in Cattle.
,, 14. Prevention of Potato Blight.
,, 15. Milk Records.
,, 16. Sheep Scab.
,, 17. The Use and Purchase of Manures.
,, 18. Swine Fever.
,, 19. Early Potato Growing.
,, 20. Calf Rearing.
,, 21. Diseases of Poultry:—Gapes.
,, 22. Basic Slag.
,, 23 Dishorning Calves.
,, 24. Care and Treatment of Premium Bulls.
,, 25. Fowl Cholera.
,, 26. Winter Fattening of Cattle.
,, 27. Breeding and Feeding of Pigs.
,, 28. Blackleg, Black Quarter, or Blue Quarter
,, 29 Flax Seed.
,, 30. Poultry Parasites—Fleas, Mites, and Lice.
,, 31. Winter Egg Production.
,, 32. Rearing and Fattening of Turkeys
,, 33. Profitable Breeds of Poultry
,, 34. *Out of Print.*
,, 35. The Liming of Land.
,, 36 Field Experiments—Barley.
,, 37. ,, ,, Meadow Hay
,, 38 ,, ,, Potatoes.
,, 39. ,, ,, Mangels.
,, 40 ,, ,, Oats.
,, 41. ,, ,, Turnips
,, 42. Permanent Pasture Grasses
,, 43. The Rearing and Management of Chickens
,, 44 "Husk" or "Hoose" in Calves.
,, 45. Ringworm on Cattle
,, 46 Haymaking.
,, 47. The Black Currant Mite.
,, 48 Foul Brood or Bee Pest.
,, 49. Poultry Fattening.
,, 50 Portable Poultry Houses
,, 51 The Leather-Jacket Grub.
,, 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
,, 54. *Out of Print.*
,, 55. The Apple.
,, 56. Cultivation of the Root Crop
,, 57. Marketing of Fruit.
,, 58. Sprouting Seed Potatoes.
,, 59. Testing of Farm Seeds.
,, 60 *Out of Print.*
,, 61. Field Experiments—Wheat.
,, 62. The Management of Dairy Cows.
,, 63. "Redwater" or "Blood-Murrain" in Cattle.
,, 64 Varieties of Fruit Suitable for Cultivation in Ireland.
,, 65. Forestry: The Planting of Waste Lands.
,, 66. Forestry: The Proper Method of Planting Forest Trees.
,, 67. *Out of Print.*
,, 68. *Out of Print.*
,, 69. The Prevention of Tuberculosis in Cattle.
,, 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
,, 71. *Out of Print.*
,, 72. *Out of Print.*
,, 73. The Planting and Management of Hedges.
,, 74. Some Common Parasites of the Sheep.
,, 75 Barley Sowing.
,, 76. American Gooseberry Mildew.
,, 77. Scour and Wasting in Young Cattle.
,, 78. Home Buttermaking.
,, 79. The Cultivation of Small Fruits.
,, 80. Catch Crops.
,, 81. Potato Culture on Small Farms.
,, 82. Cultivation of Main Crop Potatoes.
,, 83. Cultivation of Osiers.
,, 84. Ensilage
,, 85. Some Injurious Orchard Insects.
,, 86. Dirty Milk.
,, 87. Barley Threshing.
,, 88. The Home Bottling of Fruit.
,, 89 The Construction of Piggeries.
,, 90. The Advantages of Early Ploughing.
,, 91. Black Scab in Potatoes.
,, 92. Home Preservation of Eggs.
,, 93. Marketing of Wild Fruits.
,, 94. *Out of Print.*
,, 95. Store Cattle *or* Butter, Bacon, and Eggs.
,, 96. Packing Eggs for Hatching.
,, 97. Weeds.
,, 98. Tuberculosis in Poultry.
,, 99. Seaweed as Manure.

SPECIAL LEAFLETS

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin

R. LLOYD PRAEGER,
National Library, Dublin.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI. No. 11.
NOVEMBER, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.E., D.Sc., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON,
KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BLACK LEOPARD NEWLY ARRIVED.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to --

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
„ 2. The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep.
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying.
„ 7. Fluke in Sheep.
„ 8 Timothy Meadows.
„ 9. The Turnip Fly.
„ 10. Wireworms.
„ 11. Preventive of White Scour in Calves.
„ 12. Liquid Manure.
„ 13. Contagious Abortion in Cattle.
„ 14. Prevention of Potato Blight.
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures.
„ 18. Swine Fever.
„ 19. Early Potato Growing.
„ 20. Calf Rearing.
„ 21. Diseases of Poultry:—Gapes.
„ 22. Basic Slag.
„ 23. Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs.
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed.
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33 Profitable Breeds of Poultry
„ 34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes.
„ 39. „ „ Mangels.
„ 40 „ „ Oats.
„ 41 „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves.
„ 45. Ringworm on Cattle
„ 46 Haymaking.
„ 47. The Black Currant Mite
„ 48 Foul Brood or Bee Pest
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax-Growing Experiments.
No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop
„ 57. Marketing of Fruit.
„ 58. Sprouting Seed Potatoes.
„ 59. Testing of Farm Seeds.
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64 Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print.*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber.
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73. The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing.
„ 76. American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78. Home Buttermaking
„ 79. The Cultivation of Small Fruits.
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms.
„ 82. Cultivation of Main Crop Potatoes.
„ 83. Cultivation of Osiers.
„ 84. Ensilage
„ 85. Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87. Barley Threshing.
„ 88. The Home Bottling of Fruit.
„ 89. The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes.
„ 92. Home Preservation of Eggs.
„ 93. Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching.
„ 97. Weeds.
„ 98. Tuberculosis in Poultry.
„ 99. Seaweed as Manure.

SPECIAL LEAFLETS

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes.
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin

R. LLOYD PRAEGER,
National Library, Dublin.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.

Vol. XXXI. No. 12.
DECEMBER, 1922.

The Irish Naturalist

A Monthly Journal
OF
GENERAL IRISH NATURAL HISTORY.

ORGAN OF THE
ROYAL ZOOLOGICAL SOCIETY OF IRELAND
DUBLIN MICROSCOPICAL CLUB,
BELFAST NATURAL HISTORY & PHILOSOPHICAL SOCIETY,
BELFAST NATURALISTS' FIELD CLUB,
DUBLIN NATURALISTS' FIELD CLUB,
CORK NATURALISTS' FIELD CLUB,
TYRONE NATURALISTS' FIELD CLUB

EDITED BY
Prof. GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
R. LLOYD PRAEGER, B.E., D.Sc., M.R.I.A.,
AND
ROBERT J. WELCH, M.R.I.A.

PRICE 1s.

DUBLIN: EASON & SON, Limited.
80 Middle Abbey Street.
BELFAST: 17 Donegall Street
LONDON: SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

THE ZOOLOGICAL GARDENS

OF THE

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

PHOENIX PARK, DUBLIN.

Open daily from 9 a.m. (*Sundays from* **12** *noon*) **till dusk.**

Admission, 1s., except Wednesdays, Saturdays, and Holidays, 6d., and Sunday afternoons, 6d., Children always Half-price.

SPECIAL RATES FOR SCHOOL CHILDREN AND EXCURSION PARTIES.

FINEST COLLECTION OF LIONS IN EUROPE.

BLACK LEOPARD NEWLY ARRIVED.

Two Fine Young Chimpanzees now in the Ape-House.

PAIR OF HANDSOME LION MARMOSETS.

YOUNG INDIAN ELEPHANT.

PAIR OF CANADIAN BISON, WITH CALVES.

BORNEAN ZEBUS, WITH CALVES.

KANGAROOS AND WOMBATS

(Newly Imported).

REFRESHMENT ROOM OPEN ALL THE YEAR.

Donations of Animals (Irish or Foreign) thankfully received.

Surplus Stock of Beasts and Birds for Sale or Exchange.

For particulars, and also for Terms and Privileges of Membership of the Society, apply to—

PROF. A. FRANCIS DIXON,
Hon. Sec., R.Z.S.,
Trinity College, Dublin.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

LIST OF THE DEPARTMENT'S LEAFLETS.

No. 1. The Warble Fly.
„ 2. The Use and Purchase of Feeding Stuffs.
„ 3. Foot Rot in Sheep.
„ 4. Intensive and Semi-Intensive Poultry Keeping.
„ 5. Celery Leaf Spot Disease or Blight.
„ 6. Charlock (or Preshaugh) Spraying.
„ 7. Fluke in Sheep.
„ 8. Timothy Meadows.
„ 9. The Turnip Fly.
„ 10. Wireworms.
„ 11. Preventive of White Scour in Calves.
„ 12. Liquid Manure.
„ 13. Contagious Abortion in Cattle.
„ 14. Prevention of Potato Blight.
„ 15. Milk Records.
„ 16. Sheep Scab.
„ 17. The Use and Purchase of Manures.
„ 18. Swine Fever.
„ 19. Early Potato Growing.
„ 20. Calf Rearing.
„ 21 Diseases of Poultry:—Gapes.
„ 22. Basic Slag.
„ 23 Dishorning Calves.
„ 24. Care and Treatment of Premium Bulls.
„ 25. Fowl Cholera.
„ 26. Winter Fattening of Cattle.
„ 27. Breeding and Feeding of Pigs.
„ 28. Blackleg, Black Quarter, or Blue Quarter
„ 29 Flax Seed.
„ 30. Poultry Parasites—Fleas, Mites, and Lice.
„ 31. Winter Egg Production.
„ 32. Rearing and Fattening of Turkeys
„ 33 Profitable Breeds of Poultry
„ 34. *Out of Print.*
„ 35. The Liming of Land.
„ 36 Field Experiments—Barley.
„ 37. „ „ Meadow Hay
„ 38 „ „ Potatoes
„ 39. „ „ Mangels
„ 40 „ „ Oats.
„ 41 „ „ Turnips
„ 42. Permanent Pasture Grasses
„ 43. The Rearing and Management of Chickens
„ 44 "Husk" or "Hoose" in Calves.
„ 45. Ringworm on Cattle
„ 46 Haymaking
„ 47. The Black Currant Mite
„ 48 Foul Brood or Bee Pest.
„ 49. Poultry Fattening.
„ 50 Portable Poultry Houses
„ 51 The Leather-Jacket Grub.
„ 52 Flax Growing Experiments.
No. 53. The Construction of a Cowhouse.
„ 54. *Out of Print.*
„ 55. The Apple.
„ 56. Cultivation of the Root Crop
„ 57. Marketing of Fruit
„ 58. Sprouting Seed Potatoes.
„ 59. Testing of Farm Seeds.
„ 60 *Out of Print.*
„ 61. Field Experiments—Wheat.
„ 62. The Management of Dairy Cows.
„ 63. "Redwater" or "Blood-Murrain" in Cattle.
„ 64 Varieties of Fruit Suitable for Cultivation in Ireland.
„ 65. Forestry: The Planting of Waste Lands.
„ 66. Forestry: The Proper Method of Planting Forest Trees.
„ 67. *Out of Print*
„ 68. *Out of Print.*
„ 69. The Prevention of Tuberculosis in Cattle.
„ 70. Forestry: Planting, Management, and Preservation of Shelter-Belt and Hedgerow Timber
„ 71. *Out of Print.*
„ 72. *Out of Print.*
„ 73. The Planting and Management of Hedges.
„ 74. Some Common Parasites of the Sheep.
„ 75 Barley Sowing.
„ 76. American Gooseberry Mildew.
„ 77. Scour and Wasting in Young Cattle.
„ 78. Home Buttermaking
„ 79. The Cultivation of Small Fruits.
„ 80. Catch Crops.
„ 81. Potato Culture on Small Farms.
„ 82. Cultivation of Main Crop Potatoes.
„ 83. Cultivation of Osiers.
„ 84. Ensilage
„ 85. Some Injurious Orchard Insects.
„ 86. Dirty Milk.
„ 87. Barley Threshing.
„ 88. The Home Bottling of Fruit.
„ 89 The Construction of Piggeries.
„ 90. The Advantages of Early Ploughing.
„ 91. Black Scab in Potatoes.
„ 92. Home Preservation of Eggs.
„ 93. Marketing of Wild Fruits.
„ 94. *Out of Print.*
„ 95. Store Cattle *or* Butter, Bacon, and Eggs.
„ 96. Packing Eggs for Hatching.
„ 97. Weeds.
„ 98. Tuberculosis in Poultry.
„ 99. Seaweed as Manure.

SPECIAL LEAFLETS

8 Destruction of Farm Pests.
12. Digging and Storing of Potatoes
18. Treatment of Allotments for the Growing of Vegetables.
19. Home Curing of Bacon.
21. Farmers and Income Tax.
23. Palm Nut Cake and Meal.

Note.—The other Special Leaflets are not now being issued.

Copies of the above leaflets can be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland. Upper Merrion Street, Dublin, Letters of application so addressed need not be stamped. Envelopes should be marked "Publications."

TO SUBSCRIBERS 15s. 0d. PER ANNUM, POST FREE.

THE SCOTTISH NATURALIST.

A MONTHLY MAGAZINE,

EDITED BY

JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.L.S.,
Keeper, National History Department, Royal Scottish Museum, Edinburgh.

WILLIAM EVANS, F.R.S.E.
Member of the British Ornithologists' Union.

PERCY H. GRIMSHAW, F.R.S.E.,
Natural History Department, Royal Scottish Museum.

This Magazine—founded in 1871—is devoted to the publication of Original Matter relating to the Natural History of Scotland, and includes Papers contributing to the elucidation of the Fauna, Observations on Life Histories, etc., and Notes recording the occurrence of uncommon species and other useful and interesting facts.

Edinburgh: OLIVER & BOYD, Tweeddale Court.

NOTICE.

Authors of Papers in the IRISH NATURALIST can be supplied with 50 Reprints at the following prices :—

	s.	d.		s.	d.
2 pp.	4	0	6 pp.	8	0
4 pp.	6	0	8 pp.	9	0

Authors should apply for Reprints when returning proofs, but any subsequent correspondence about Reprints should be sent to the Printers, Messrs. A. Thom and Co., 8 Crow Street, Dublin, not to the Editors nor the Publishers.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Please address to one of the Editors and not to the Publishers, and do not write on postcards.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Royal College of Science, Dublin.

R. LLOYD PRAEGER,
National Library, Dublin.

Vol. xxxi., No. 12. December, 1922.

CONTENTS.

ALEX. THOM AND CO., LIMITED, DUBLIN.